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MAINTENANCE AND SERVICE GUIDE
Compaq ProLiant 4500 Servers
First Edition (May 1995)
Text Number 188470-001

PREFACE

This *Maintenance and Service Guide* is a troubleshooting guide that can be used for reference when servicing the Compaq ProLiant Family of Servers.

Compaq Computer Corporation reserves the right to make changes to Compaq ProLiant 4500 Servers without notice.

Symbols

The following text and symbols mark special messages throughout this guide:

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of data.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Technician Notes

WARNING: Only authorized technicians trained by Compaq should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard. Any indications of component replacement or printed wiring board modifications may void any warranty.

CAUTION: To properly ventilate your system, you must provide at least 12 inches (30.48 cm) of clearance at the front and back of the computer.

CAUTION: The computer is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

Locating Additional Information

The following documentation is available to support these products:

- User Documentation
- *Compaq Service Quick Reference Guide*
- Service Training Guides
- *Compaq Service Advisories and Bulletins*
- *Compaq QuickFind*
- Compaq Insight Manager 2.0

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ILLUSTRATED PARTS CATALOG

This chapter provides the illustrated parts breakdown and a spare parts list for the family of Compaq ProLiant 4500 Servers.

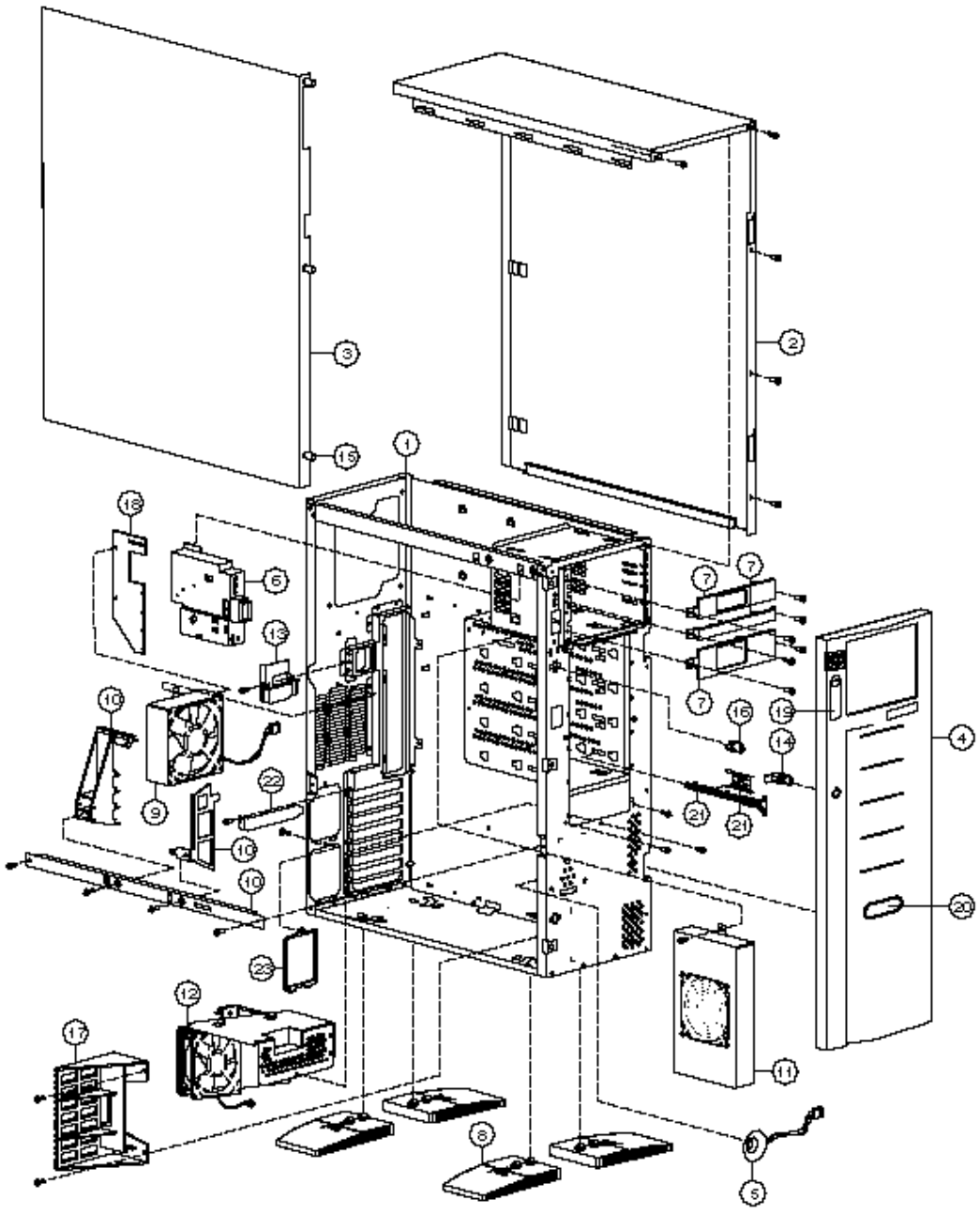

Figure 1-1. Exploded View of the Compaq ProLiant 4500 Server Mechanical Parts

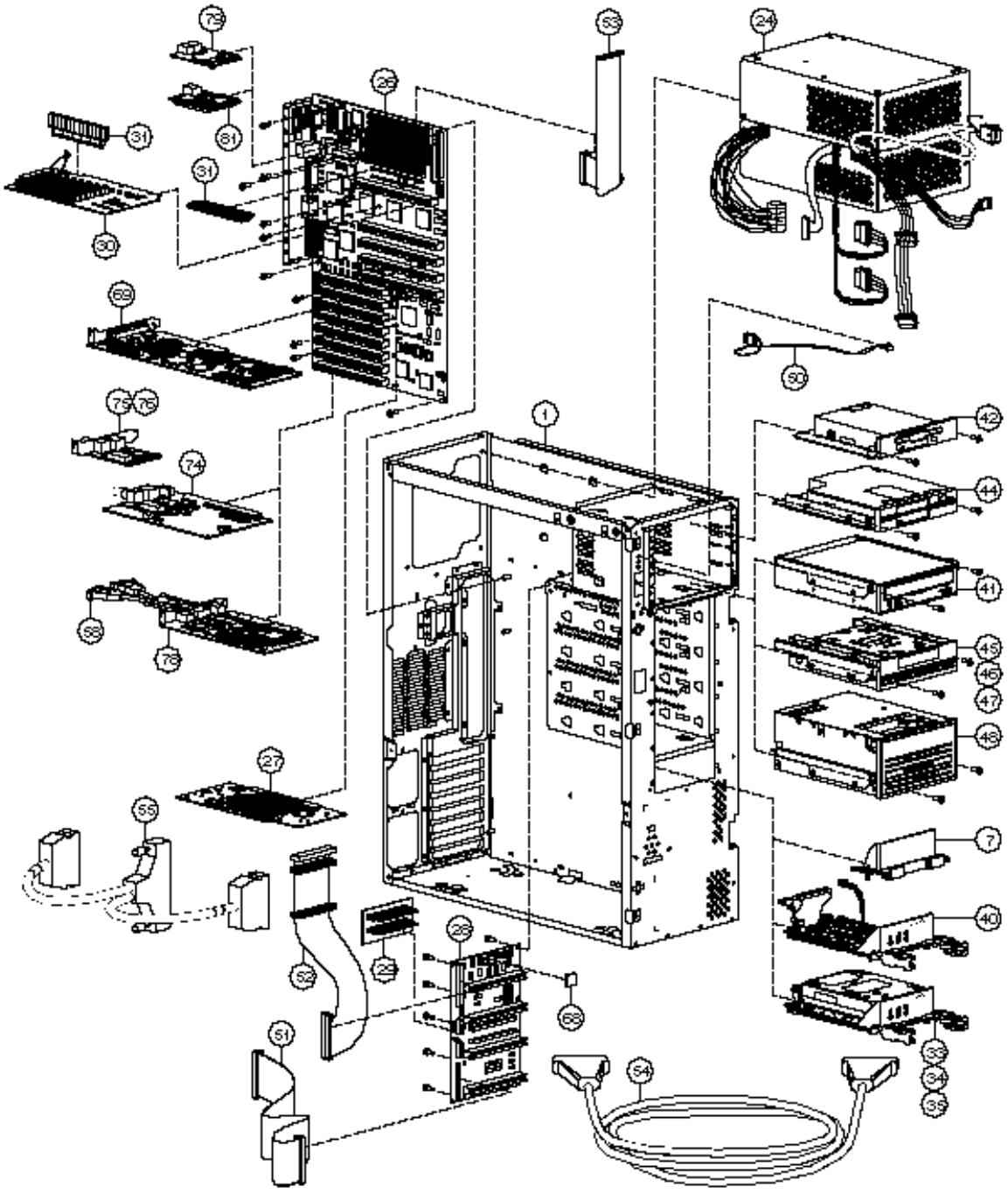

Figure 1-2. Exploded View of the Compaq ProLiant 4500 Server System Components

Table 1-1
Spares Parts List - Compaq ProLiant 4500

Item	Description	Part Number
CHASSIS		
1	Chassis	199731-001
2	Hood	148593-001
3	Side Access Panel	148592-001
4	Front Bezel Door	188487-001
5	Speaker	148590-001
6	Power Supply/Inter-Lock Switch	148583-001
7	Bezel Kit (1/6, 1/3, 1/2 Height - Qty 5 each) and Empty Hot-Pluggable Drive Cover	211449-201
8	Foot	148580-001
9	System Fan	148581-001
10	Chassis Brace with Board Guide (3 parts)	199732-001
11	Plenum Fan	199728-001
12	Lower Front Fan (under drive cage)	189916-001
13	Modem Bracket	148723-001
14	Key-Lock Assembly	148725-001
15	Thumb Screw Assembly (Qty 3)	148594-001
16	Front Bezel Guides (Qty 5)	148724-001
17	Board Guide (Lower)	148744-001
18	Board Guide for Processor and Memory (Rear Fan)	199733-001
19	Bezel Switch Cover	148745-001
20	Logo Kit (Qty 2)	188488-001
21	Drive Guide and Ground Spring (Qty 5 each)	146771-001
22	Slot Cover (Qty 5)	141081-001
23	SCSI Cover	190170-001
SYSTEM COMPONENTS		
24	Power Supply	188406-001
25	Redundant Power Supply 488 W (Option)	163828-001
	BOARDS	
26	System I/O Board	188414-001
27	Processor Board 5/100 MHz	184793-001
28	Hot-Pluggable Drive Backplane Board (Wide SCSI)	188490-001
29	Pass-Thru Board (Wide SCSI)	199612-001
	MEMORY	
30	Memory Expansion Board	139947-001
31	4-MB SIMM (80ns)	118741-001
	8-MB SIMM (80ns)	128954-001*
	16-MB SIMM (80ns)	139143-001*
	32-MB SIMM (80ns)	139949-001*
	4-MB SIMM (70ns)	141754-001*
	8-MB SIMM (70ns)	141755-001*
	16-MB SIMM (70ns)	149947-001*
	32-MB SIMM (70ns)	149948-001*
	64-MB SIMM (70ns)	188489-001*
	4-MB SIMM (60ns)	139139-001*

Continued

Spares Parts List - Compaq ProLiant 4500 *Continued*

Item	Description	Part Number
	8-MB SIMM (60ns)	139140-001*
	16-MB SIMM (60ns)	139141-001*
	32-MB SIMM (60ns)	139142-001*
	MASS STORAGE	
33	550 MB Pluggable Fast-SCSI-2 Drive	146799-001
34	1.05 GB Pluggable Fast-SCSI-2 Drive	146717-001
35	2.1 GB Pluggable Fast-SCSI-2 Drive	199428-001
36	4.3 GB Pluggable Fast-SCSI-2 Drive	199584-001*
37	2.1 GB Pluggable Fast-Wide SCSI-2 Drive	199643-001*
38	4.3 GB Pluggable Fast-Wide SCSI-2 Drive	199598-001*
39	Hot-Pluggable Tray Adapter (Fast-Wide SCSI-2)	199656-001*
40	Hot-Pluggable Tray Adapter (Fast-SCSI-2)	146781-001
41	Tray Load CD-ROM Drive	142223-201
42	1.44 MB, 3.5" Diskette Drive (Standard)	144207-201
43	1.44 MB, 3.5" Diskette Drive (Option)	112565-001*
44	1.2 MB, 5.25" Diskette Drive	112566-001
45	2/8-GB DAT Drive	142074-201
46	525-MB ACA Tape Drive	142073-201
47	4/16-GB TurboDAT Drive	199464-201
48	TurboDAT Autoloader	199466-201
49	1.2-GB Tape Drive	199615-201*
	CABLE KITS	
50	LED Cables	148585-001
51	Internal Fast-Wide SCSI-2 Cable, 23”	199606-003**
52	2-Device Internal Cable with Terminator, 36”	148728-001**
53	Diskette Cable	143706-001**
54	External SCSI Signal Cable 6'	146776-001
55	External 100-Pin to 50-Pin Cable	142159-001
56	Loop Back Cable (2 CH NIC)	142254-001*
57	Loop Back Cable (NetFlex)	142054-001*
58	2 Channel Ethernet "Y" Cable	197134-001
	KEYBOARDS	
59	Keyboard, U.S. English	160648-101*
	Keyboard, U.K. English	160648-103*
	Keyboard, German	160648-104*
	Keyboard, French	160648-105*
	Keyboard, Italian	160648-106*
	Keyboard, Spanish	160648-107*
	Keyboard, Danish	160648-108*
	Keyboard, Norwegian	160648-109*
	Keyboard, Swedish/Finnish	160648-110*
	Keyboard, Swiss	160648-111*
	Keyboard, French Canadian	160648-112*
	Keyboard, Portuguese	160648-113*
	Keyboard, Turkish	160648-114*
	Keyboard, Greek	160648-115*
	Keyboard, Latin American	160648-116*

* Not Shown

** Cables shown in chapter 2 of this guide

Continued

Spares Parts List - Compaq ProLiant 4500 *Continued*

Item	Description	Part Number
	Keyboard, Arabic	160648-117*
	Keyboard, Belgian	160648-118*
	Keyboard, BHCSY	160648-120*
	Keyboard, Hungary	160648-121*
	Keyboard, Polish	160648-122*
	Keyboard, Slovakia	160648-123*
	Keyboard, Russia	160648-124*
	Keyboard, Czech	160648-129*
	MISCELLANEOUS	
60	Maintenance and Service Guide	188491-001*
61	Administrator's Guide, English	188485-001*
	Administrator's Guide, German	188485-041*
	Administrator's Guide, French	188485-051*
	Administrator's Guide, Italian	188485-061*
	Administrator's Guide, Spanish	188485-071*
	Administrator's Guide, Japanese	188485-191*
	Administrator's Guide, Dutch	188485-331*
62	System ROMpaq	143198-001*
63	Option ROMpaq	142207-001*
64	RTC Chip with Battery	149344-001*
65	Shipping Box	148577-001*
66	Shipping Buns and Plastic Bag	148726-001*
67	Power Supply Maintenance Key (Qty 5)	148757-001*
68	Drive Backplane ROM	146705-001
	OPTIONS	
69	SMART Controller	181132-001
70	Fast-SCSI-2/E Controller	142040-001*
71	Fast-Wide SCSI-2/E Controller	199634-001*
72	NetFlex Controller	142041-001*
73	NetFlex-2 Controller	142222-001*
74	NetFlex-3/E Controller	169801-001
75	NetFlex-3 100 Base-TX Upgrade Module	169805-001
76	NetFlex-3 100 VG-AnyLAN Upgrade Module	169803-001
77	Token Ring Module	142042-001*
78	DualPort Ethernet Controller	142151-001
79	2400 Baud LTE Modem	121250-001
80	2400 Baud LTE Modem (DAA)	127831-001*
81	SpeedPaq Modem (US only)	199906-001

* Not Shown

REMOVAL AND REPLACEMENT PROCEDURES

This chapter provides subassembly/module-level removal and replacement procedures for the Compaq ProLiant 4500 Family of Servers. After completing all necessary removal and replacement procedures, run the DIAGNOSTICS program to verify that all components operate properly.

> **NOTE:** Refer to the support software guide for procedures on using the Compaq System Configuration utility when installing or removing expansion boards, mass storage devices, and Extended Industry Standard Architecture (EISA) options.

To service Compaq ProLiant 4500 Servers, you need:

- Torx T-15 screwdriver
- Power Supply Service Maintenance Key
- Ethernet loopback plug
- NetFlex loopback plug
- System Configuration software
- Diagnostics software
- Drive Array Advanced Diagnostics software

ELECTROSTATIC DISCHARGE INFORMATION

A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. To prevent electrostatic damage observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Cover work stations with approved static-dissipating material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Keep work area free of non-conductive materials such as ordinary plastic assembly aids and foam packing.
- Always be properly grounded when touching a static-sensitive component or assembly.
- Avoid touching pins, leads or circuitry.
- Always place drives PCB assembly side down on the foam.
- Use conductive field service tools.

PREPARATION PROCEDURES

Before beginning any of the removal and replacement procedures, complete the following steps:

1. Turn the computer and any peripheral devices off.
2. Disconnect the AC power cord from the AC outlet, then from the server.
3. Disconnect all external peripheral devices from the server.

POWER SUPPLY SAFETY INTERLOCK

The Compaq ProLiant 4500 Server is equipped with a safety interlock switch to minimize the risk of exposure to high voltage and maintain proper air flow for cooling of the processor and mass storage devices. When the side access panel is removed, the power supply is automatically disabled. This safety feature can be defeated with a Service Maintenance Key (Spares Part Number 148757-001) if power is required when servicing the server with the side access panel removed.

WARNING: High voltage present. Extreme care must be taken when running the Compaq ProLiant 4500 Server with the system unit cover removed and the safety interlock defeated.

CAUTION: The Compaq ProLiant 4500 Server should always be operated with the system unit cover on. Proper cooling will not be achieved with the system unit cover off.

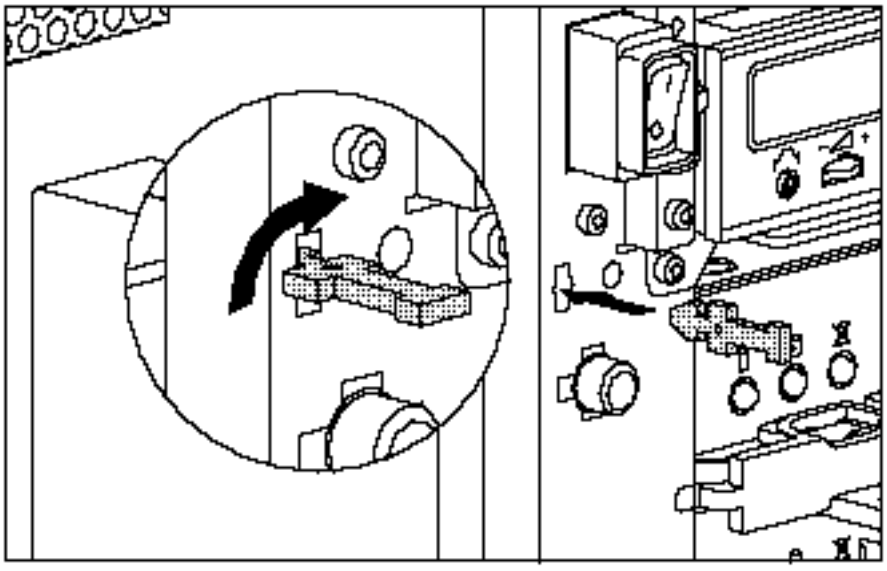

Figure 2-1. Power Supply Interlock Defeat

REMOVAL AND REPLACEMENT PROCEDURES

Front Bezel Door/Side Access Panel

WARNING: High voltage present. Extreme care must be taken when running the Compaq ProLiant 4500 Server without the system unit cover on.

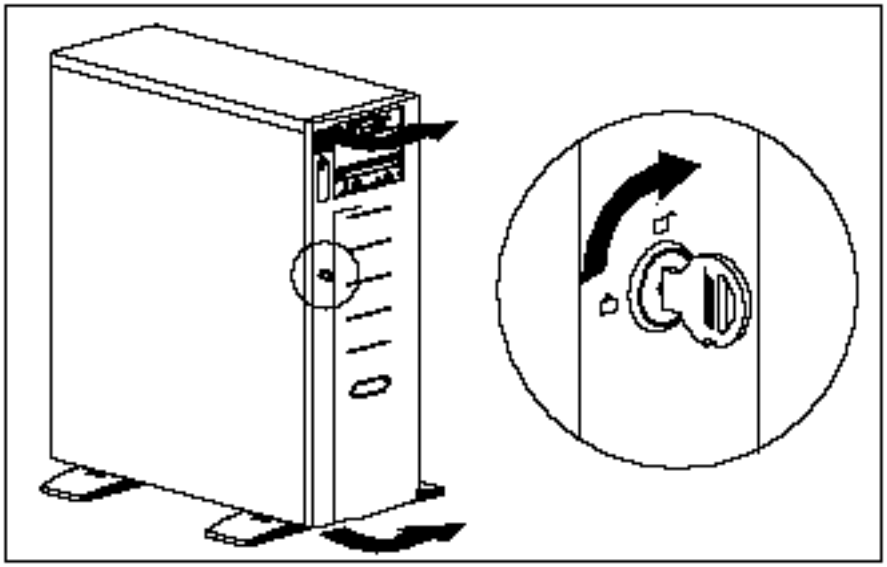

Figure 2-2. Opening Front Bezel Door

1. Unlock front bezel door and swing open.

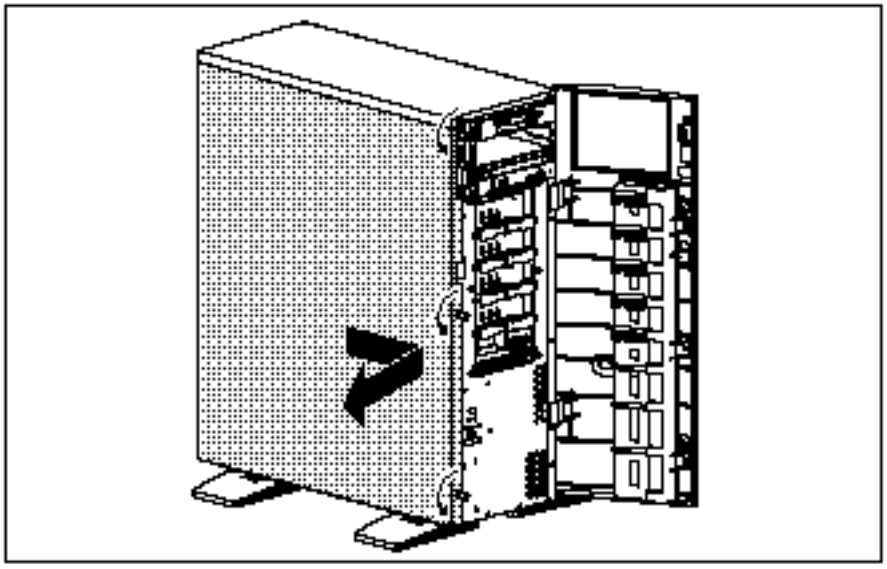

Figure 2-3. Removing the Side Access Panel

2. Loosen slotted thumb screws at front panel.

3. Slide the side access panel forward and then lift out.
4. Reverse steps for replacing side access panel.

System Unit Cover

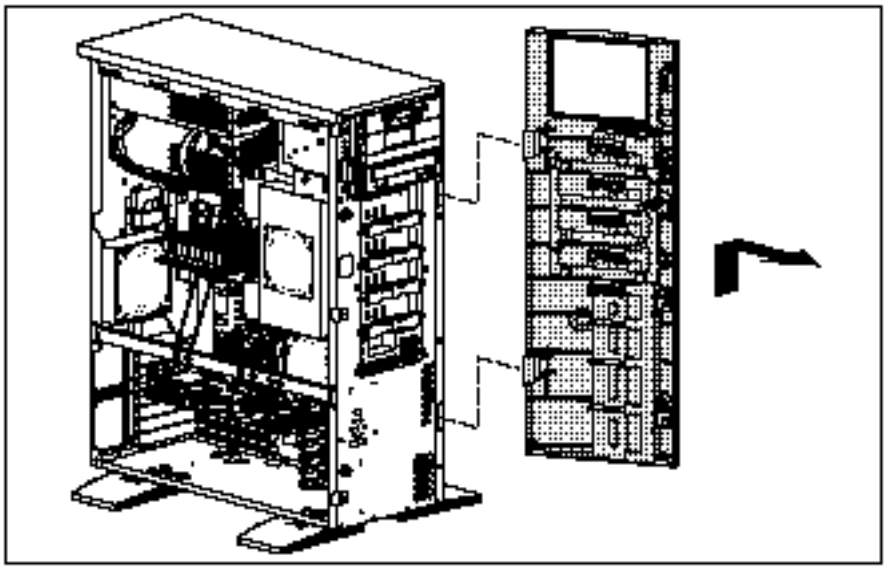

Figure 2-4. Removing the Front Bezel Door

1. Lift and remove the front bezel door.

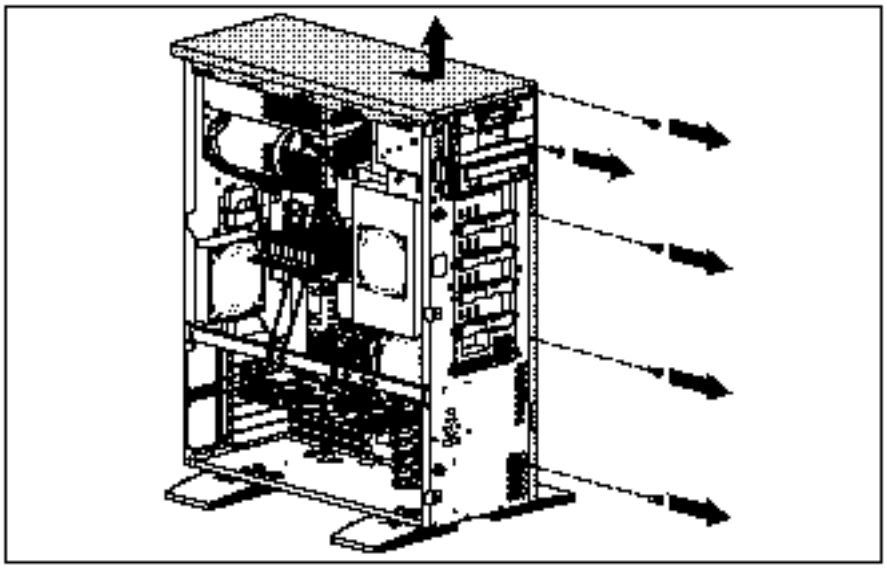

Figure 2-5. Removing the System Unit Cover

2. Unscrew and remove screws at front panel.
3. Slide system unit cover forward and then up.
4. Reverse steps for replacing system unit cover.

Mass Storage Devices

The Compaq ProLiant 4500 Server contains two areas for mass storage devices: the removable media area and the hot-pluggable hard drive bays.

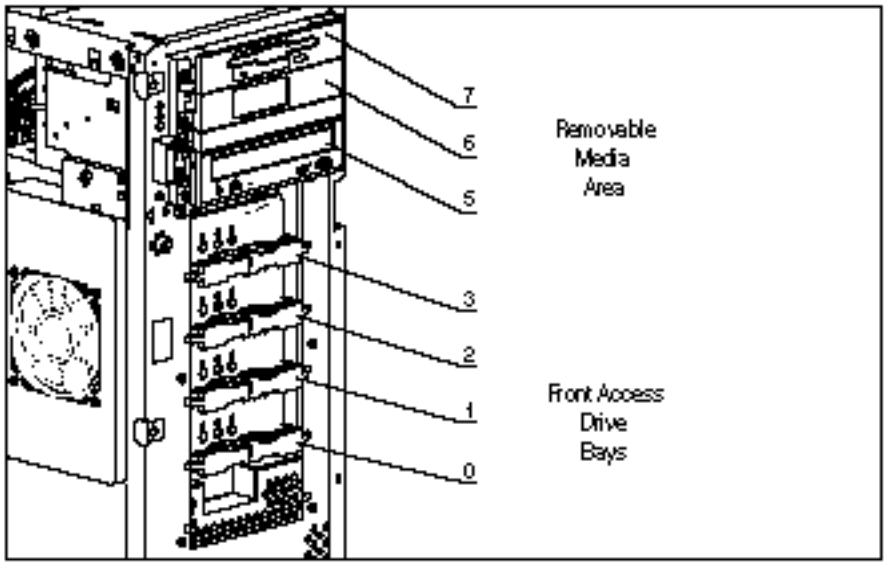

Figure 2-6. Mass Storage Device Locations and Bay Numbers

Removable Media Storage Devices

Table 2-1 shows the supported mass storage devices and their supported locations.

Table 2-1
Removable Media Bay Configurations

	Storage Bays		
Mass Storage Device	**7**	**6**	**5**
1.44-MB, 3.5" Diskette Drive	✓	✓	
1.2-MB, 5.25" Diskette Drive		✓	
2/8-GB Digital Audio Tape (DAT) Drive		✓	✓ *
525-MB ACA Tape Drive		✓	✓ *
4/16-GB Digital Audio Tape (DAT) Drive		✓	✓ *
CD-ROM Drive			✓
1.2-GB Tape Drive		✓	✓ *
TurboDAT Drive w/ Autoloader (full height device requires both bays, 5 and 6)		✓	✓ *

* CD-ROM drive in bay 5 must be removed.

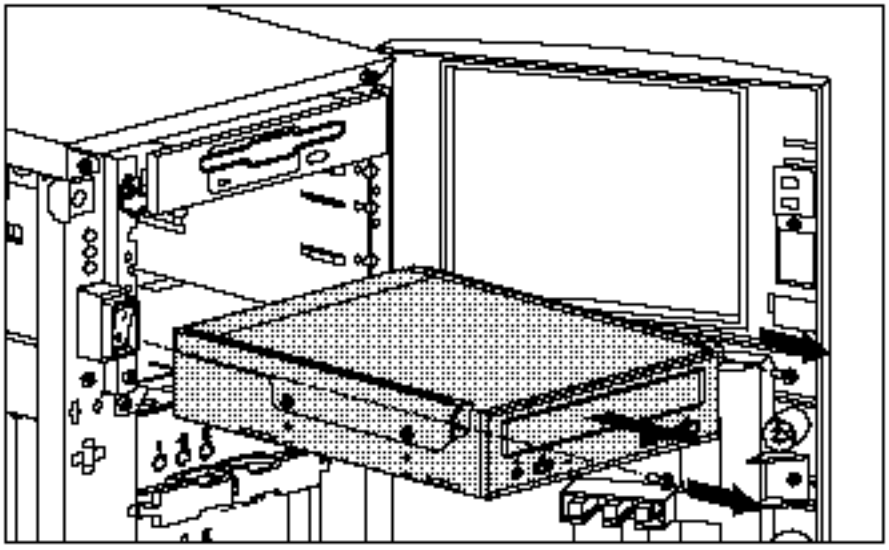

Figure 2-7. Removing a Storage Device from the Removable Media Area

1. Unlock and open the front bezel door.
2. Remove the side access panel.
3. Disconnect power and signal cables from rear of drive.
4. Remove retaining screws.
5. Slide mass storage device out.
6. Reverse steps for installation.

Hot-Pluggable Hard Drives

Hot-Pluggable hard drives used in combination with the Compaq Smart SCSI Array Controller can be replaced while the power is still on.

> **NOTE:** It is not necessary to set the SCSI ID jumpers on a Compaq replacement Hot-Pluggable hard drive. The SCSI ID is set automatically by the backplane board and the Hot-Pluggable tray when the drive is installed.

CAUTION: Before removing any Hot-Pluggable hard drive, read the guidelines listed in the following section.

Important Guidelines About Replacing Hot-Pluggable Hard Drives

When a drive configured for fault tolerance is replaced, the replacement drive will automatically begin being restored when it is installed. When a drive is in the process of being restored, the *On-line* LED will flash green. The LED will continue to flash until the drive is completely restored.

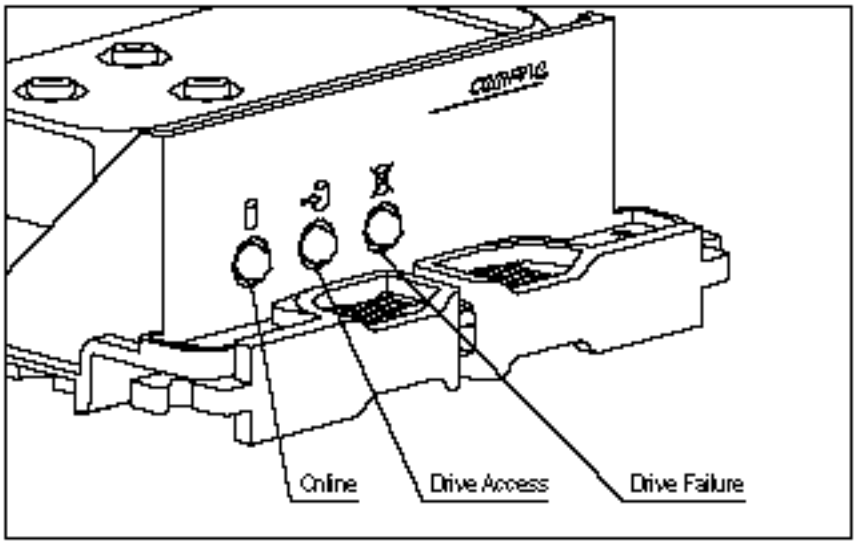

Figure 2-8. Hot-Pluggable Hard Drive LED Indicators

When replacing Hot-Pluggable hard drives, these guidelines must be followed:

- **Never remove more than one drive at a time.** When a drive is replaced, the controller uses data from the other drives in the array to reconstruct data on the replacement drive. If more than one drive is removed, a complete data set is not available to reconstruct data on the replacement drive(s).
- **Never remove a working drive when another drive has failed.** Drives that have been failed by the controller are indicated by the amber *Drive Failure* LED on the drive tray. Permanent data loss will occur if a working drive is removed when replacing a failed drive.

- **Never remove a drive while another drive is being rebuilt.** A drives' *On-line* LED will be flashing green whenever it is being rebuilt. A replaced drive is restored from data stored on the other drives.
- **Never turn a ProLiant Storage System off while the Server controlling it is powered on.** Doing so will cause the server's SMART Controller to mark the drives as "failed." This could result in permanent data loss.
- **If an on-line spare drive is installed, wait for it to complete rebuilding before replacing the failed drive.** When a drive fails, the on-line spare will become active and begin being rebuilt as a replacement drive. After the on-line spare has been completely rebuilt (*On-line* LED will be on solid), the failed drive should be replaced with a new replacement drive. **Do not** replace the failed drive with the on-line spare.
- **A POST error message (1786) will occur when the system is turned on if a drive(s) has been replaced while the system is OFF.** When this occurs you will be prompted to:

  PRESS F1 TO BOOT THE SYSTEM AND REBUILD THE REPLACED DRIVE OR,
  PRESS F2 TO BOOT THE SYSTEM AND NOT REBUILD THE DRIVE(S).

CAUTION: Pressing F2 will cause permanent data loss to the entire logical drive. F2 should be pressed only if all of the drives have been replaced or if complete data loss is desired.

Replacing Hot-Pluggable Hard Drives

The front access drive bay area is located behind the front bezel door and can hold up to four half height hot-pluggable hard drives.

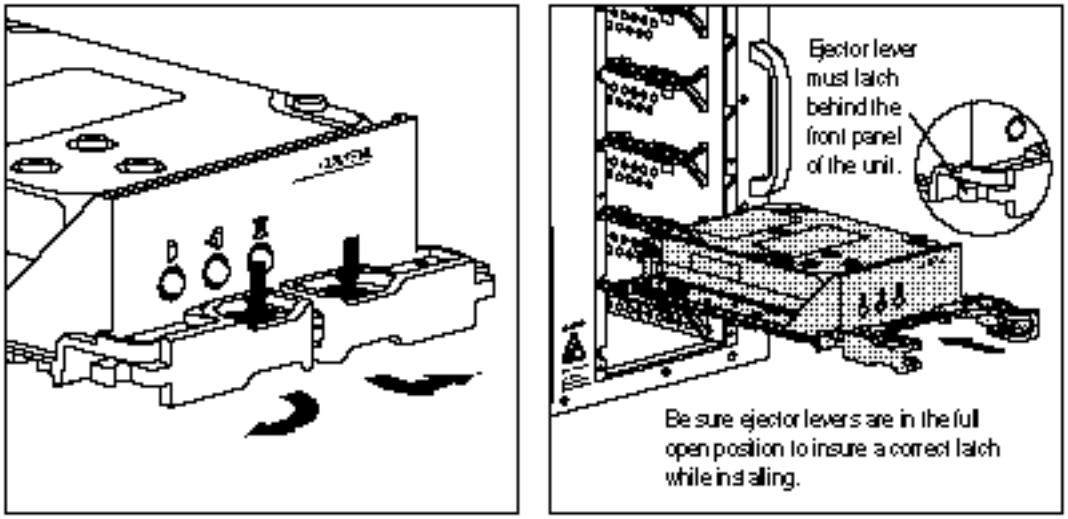
Ejector lever must latch behind the front panel of the unit.
Be sure ejector levers are in the full open position to insure a correct latch while installing.

Figure 2-9. Replacing a Hot-Pluggable Hard Drive

To Remove Drive

1. Press the releases on the ejector levers and swing levers out as shown. This will pull the drives out of the backplane connector.
2. Slide the Hot-Pluggable hard drive out.

To Install a Drive

1. Slide the hot-pluggable hard drive all the way into the drive cage.
2. Swing the ejector levers in to seat the drive tray's connector into the backplane connector.

Cable Folding and Routing Diagrams

CAUTION: When routing cables, always make sure that the cables are not in a position where they will be pinched or crimped.

Cable Diagram for Diskette Drive

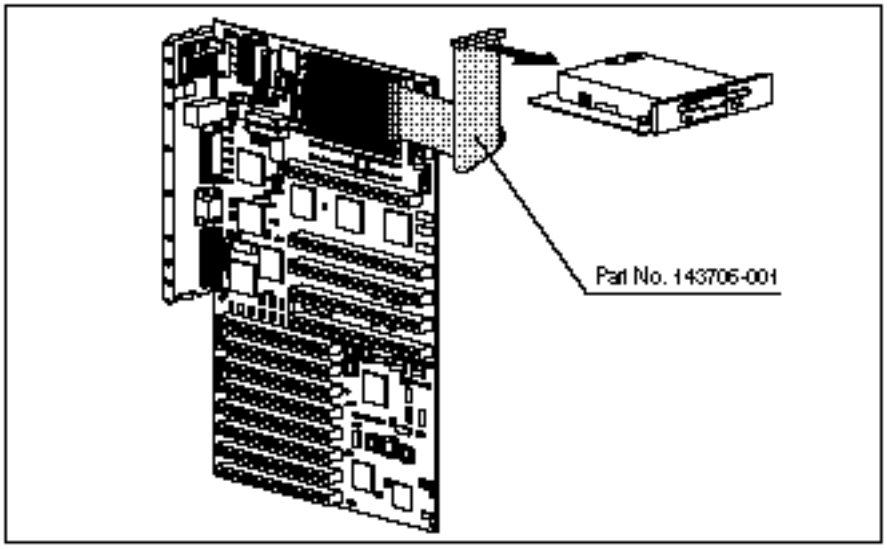

Figure 2-10. Diskette Drive Cable, Spares Part No. 143706-001

Cable Diagram for Removable Media Storage Devices (2-Device with Termination)

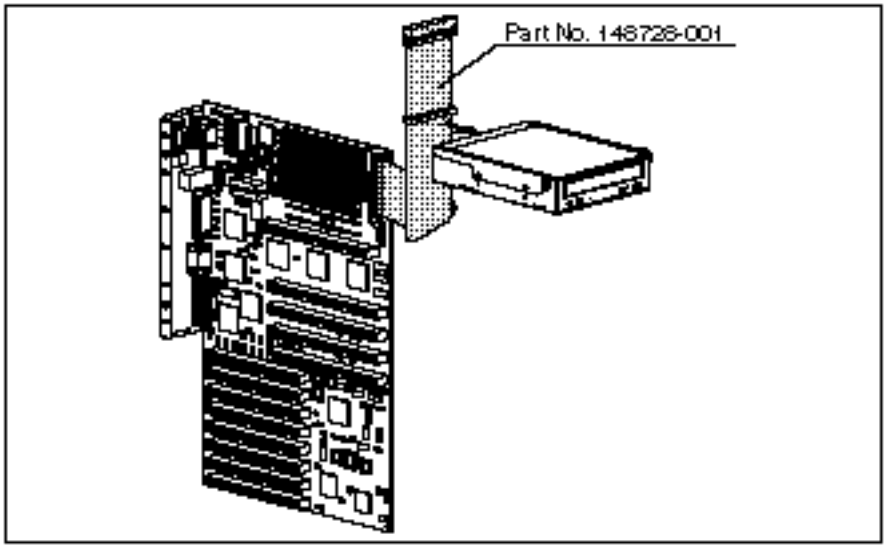

Figure 2-11. Removable Media Storage Device Cable,
Spares Part No. 148728-001

Cable Diagram for Internal Fast-Wide SCSI-2 Device and Removable Media Storage Devices

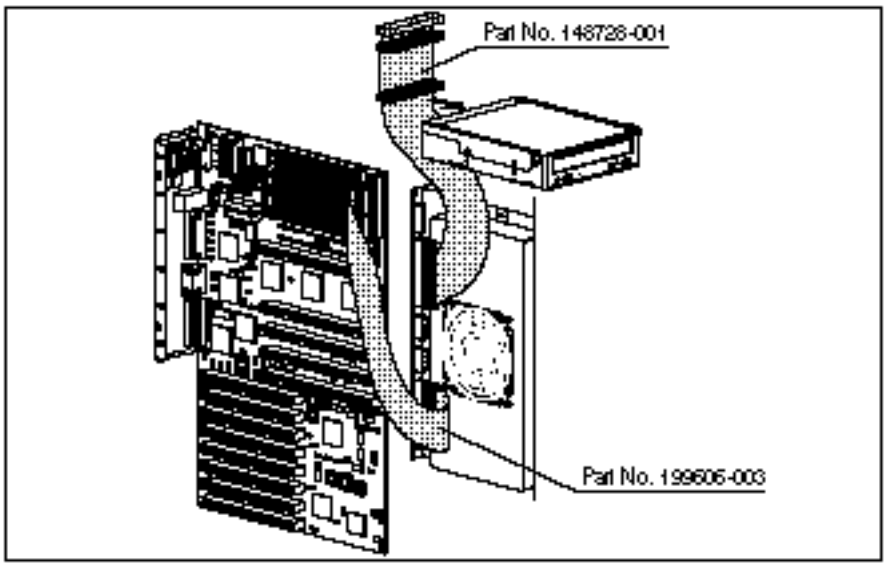

Figure 2-12. Internal SCSI Cables,
Spares Part No. 199606-003
Spares Part No. 148728-001

IMPORTANT: All SCSI hard drives on the same SCSI bus must be internal (within the server) or in an external storage system, but not both. A configuration with both internal and external SCSI hard drives requires more than one single-channel SCSI controller. A multi-channel controller, such as the Compaq SMART SCSI Array Controller, supports both internal and external SCSI hard drives on separate SCSI buses.

IMPORTANT: All integrated 32-Bit SCSI-2 Controllers must be terminated by connecting one of the following to the Fast-SCSI-2 or Fast-Wide SCSI-2 connector on the system board:

- Terminated SCSI cable
- SCSI cable that is also attached to the lower SCSI-2 connector of a hot-pluggable backplane
- 50-pin Active Terminator (Spare Part No. 169178-001)

Boards

This section describes how to remove and replace the hot-pluggable hard drive backplane board, memory modules, system, processor and option boards.

Hot-Pluggable Drive Backplane Board

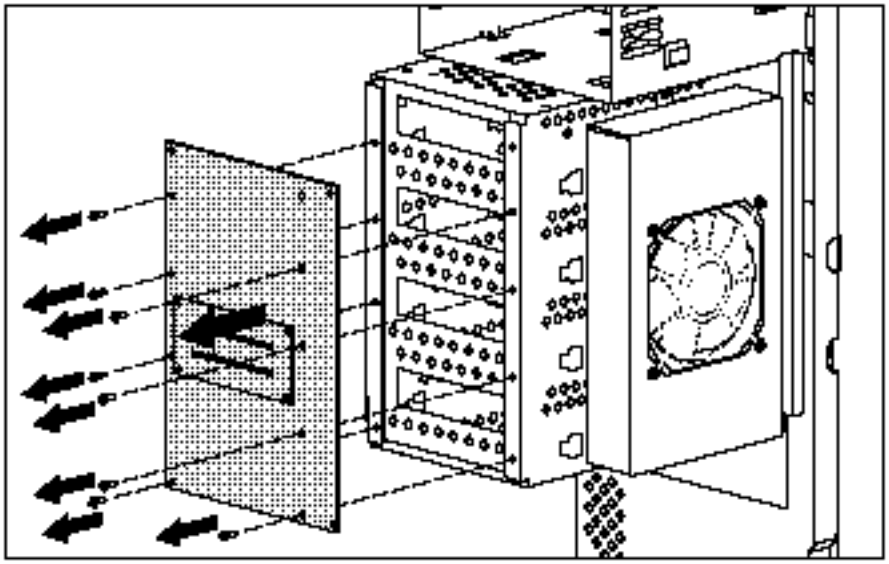

Figure 2-13. Removing the Backplane Board

1. Label and remove all hard drives.

CAUTION: Be sure to label the drives before removing so that they can be replaced in their original positions. Failure to do so will result in permanent data loss.

2. Remove processor board(s).
3. Label and disconnect all cables from the backplane board.
4. Remove the Pass-Thru board.
5. Remove retaining screws (8).
6. Remove board.
7. Reverse steps to replace backplane board.

Memory

The ProLiant 4500 Server comes standard with 16 megabytes of system memory. Memory can be expanded to a maximum of 1.024 gigabytes by installing a matched set of four JEDEC 4-, 8-, 16-, 32-, or 64-megabyte 60-, 70-, or 80-ns industry-standard SIMM modules in the eight SIMM sockets on the system board for a total of 512 megabytes and the eight SIMM sockets on the 512-megabyte Memory Expansion Board.

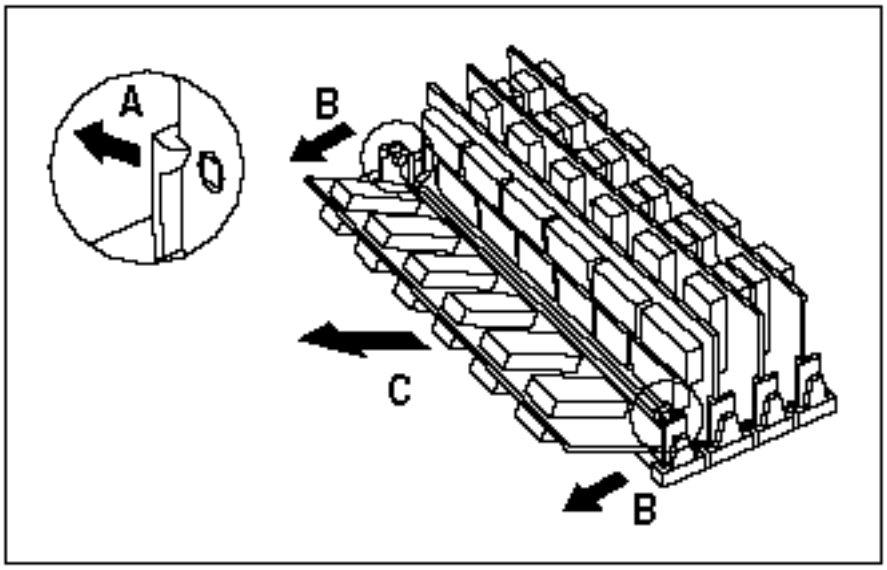

Figure 2-14. Removing the SIMM Module

1. Remove the side access panel.
2. Press the SIMM connector latches outward [A].
3. Tilt the SIMM module forward [B].
4. Lift the SIMM module out [C].
5. To replace the SIMM module reverse these steps.

> **IMPORTANT:** Run Compaq System Configuration Utility if installed memory size has changed. A POST error message will be displayed at power up prompting you to run the System Configuration Utility.

The following guidelines **MUST** be followed when installing or replacing memory:

- SIMMs must be installed in matched sets of four at time; for example: four 16-megabyte modules.
- Matched SIMMs must be the same size and speed.
- Install SIMM sets in bank 1 first, then in bank 2.

CAUTION: Use only JEDEC standard SIMMs. Non-JEDEC SIMMs may adversely affect data integrity.

NOTE: The Compaq ProLiant 4500 requires that RAM be installed in increments of four SIMMs at a time. The SIMMs must be the same size and speed. The specific SIMM bit pattern required to support error checking and coreecting (ECC) memory is based on the parity scheme; one byte data, one bit parity. The data byte and parity are constructed of DRAMs that are "n" locations deep by 4-bits wide or 1-bit wide and "n" can be any number. (that is, "n" locations deep x 4-bits wide or "n" locations deep x 1-bit wide.) Use Compaq SIMMs or JEDEC-compliant SIMMs that conform to this parity scheme only.

The following table shows typical memory configurations for the Compaq ProLiant 4500 Server.

Table 2-2
Example of SIMM Upgrade Combinations

	System Board		Expansion Board	
Total Memory	**Bank 1**	**Bank 2**	**Bank 3**	**Bank 4**
16 MB	4x4 MB			
32 MB	4x8 MB			
64 MB	4x8 MB	4x8 MB		
64 MB	4x16 MB			
128 MB	4x16 MB	4x16 MB		
128 MB	4x32 MB			
128 MB	4x8 MB	4x8 MB	4x8 MB	4x8 MB
192 MB	4x32 MB	4x16 MB		
192 MB	4x16 MB	4x16 MB	4x16 MB	
256 MB	4x64 MB			
512 MB	4x64 MB	4x64 MB		
512 MB	4x32 MB	4x32 MB	4x32 MB	4x32 MB
1024 MB	4x64 MB	4x64 MB	4x64 MB	4x64 MB

System Board

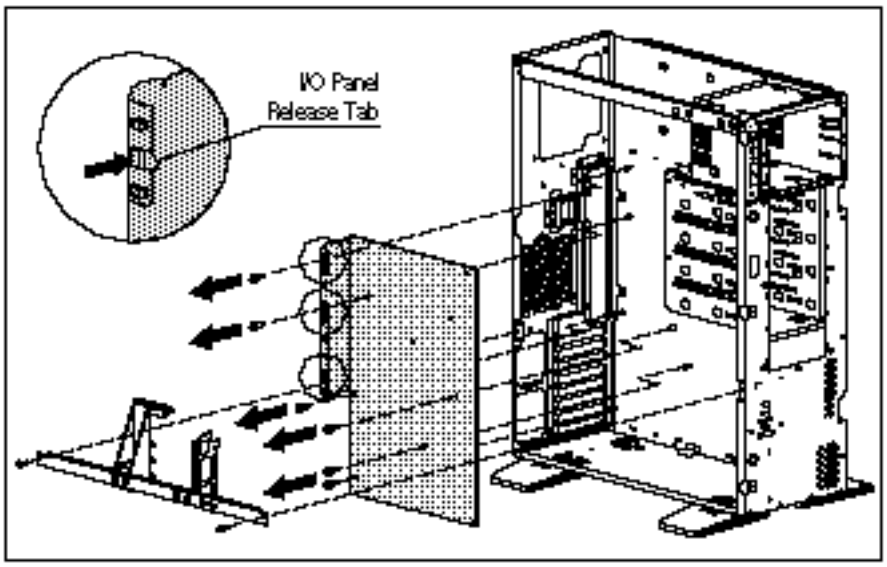

Figure 2-15. Removing the System Board

1. Remove all option boards.
2. Remove middle chassis brace.
3. Remove processor board and memory board.
4. Disconnect all cables from system board.
5. Remove retaining screws and push the three I/O panel release tabs.
6. Slide board toward front of chassis approximately 0.4 inches (1 cm) and lift board out.
7. Reverse steps to replace system board.

NOTE: Be sure the switch settings on SW1 are set to the *Tower* configuration.

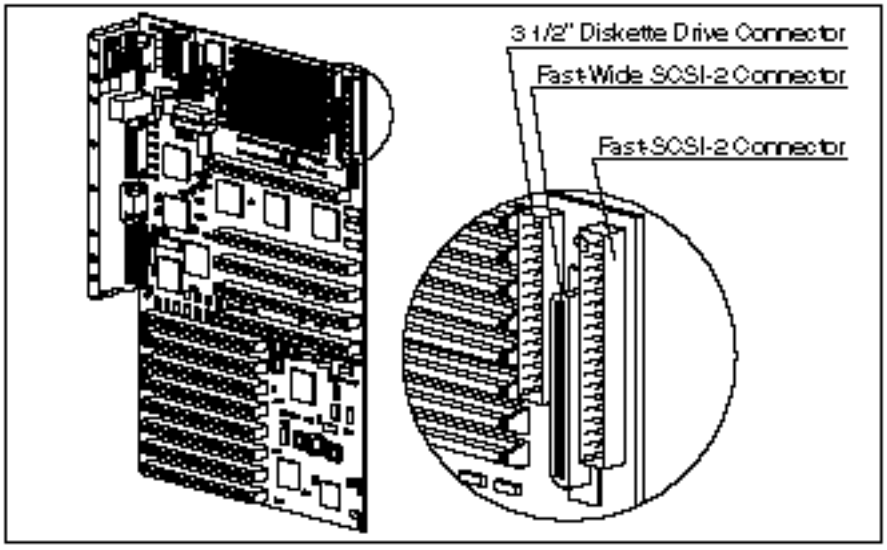

Figure 2-16. System Board Connectors

Processor Board

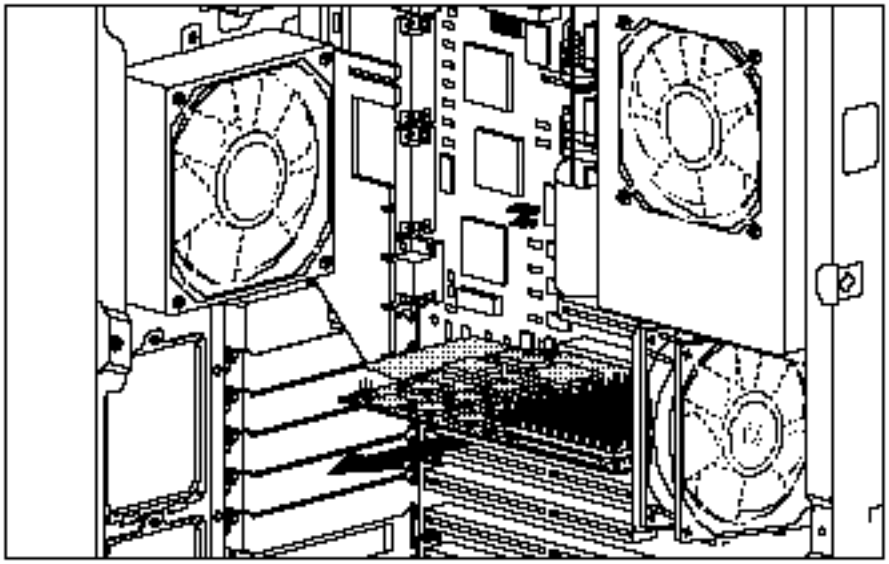

Figure 2-17. Removing the Processor Board

1. Remove middle brace.
2. Pull board straight out.
3. Reverse steps for processor board installation.

Option Boards

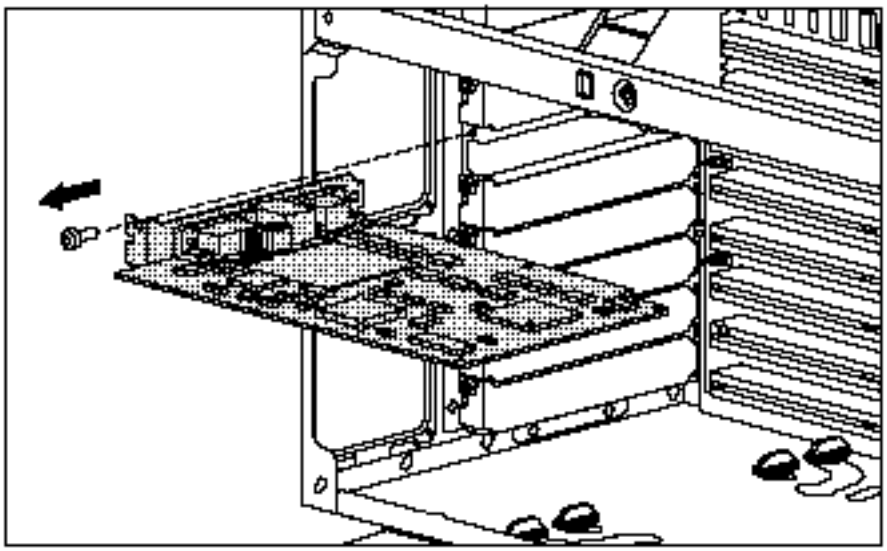

Figure 2-18. Removing the Option Board

1. Remove any cables connected to the board.
2. Remove retaining screw and pull board straight out.
3. Reverse steps for option board installation.

Power Supply

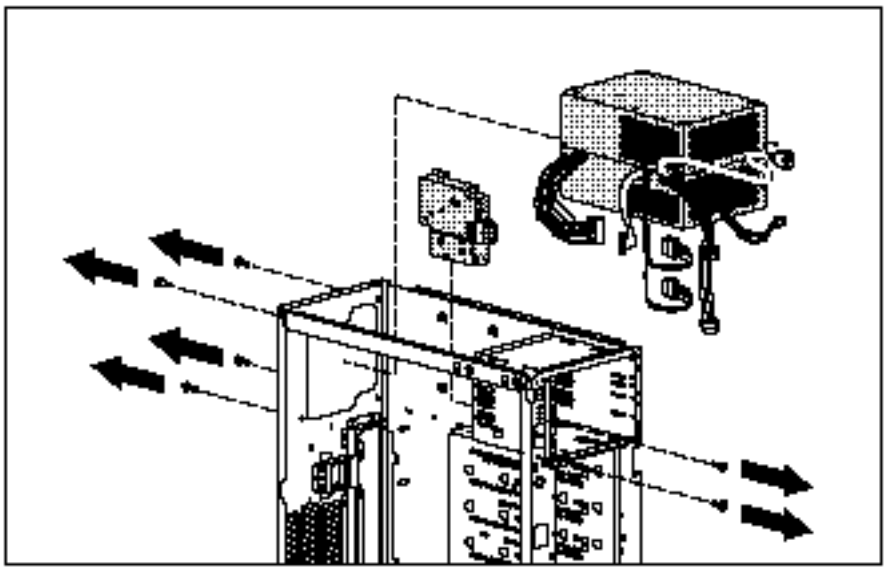

Figure 2-19. Removing the Power Supply

1. Turn power off and remove power cord from rear of unit.
2. Open the front bezel door, remove the side access panel, and remove the system unit cover.
3. Disconnect all power connectors from boards and or peripheral devices.
4. Remove interlock power switch bracket retaining screws.
5. Pull bracket out and remove power switch, safety interlock switch connectors, and cable from bracket (refer to Figure 2-20).
6. Remove screws at rear of power supply.
7. Lift power supply out pulling switch and cable through chassis.
8. Reverse steps for replacement.

NOTE: When replacing the power supply, make sure that the power switch cable is properly threaded through the bracket's strain relief as shown in Figure 2-20.

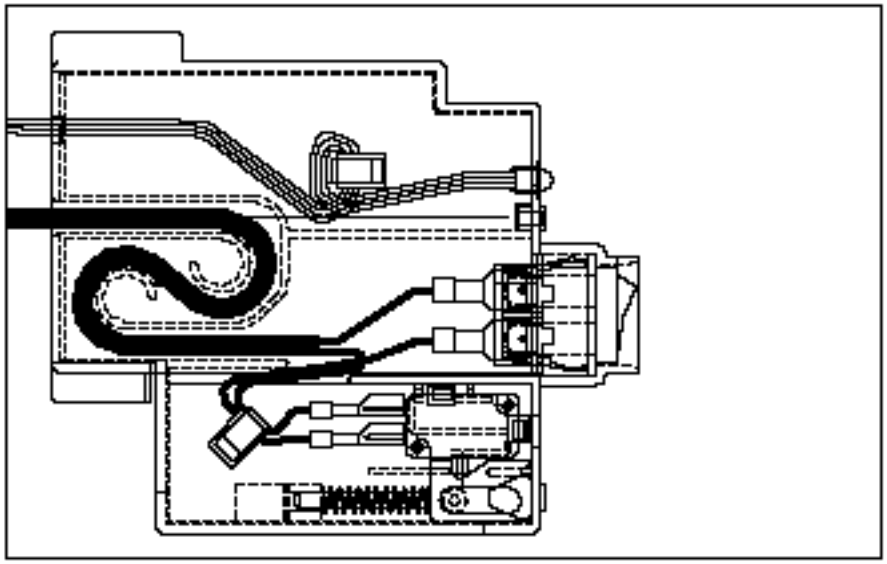

Figure 2-20. Power Supply Switch Cable Strain Relief

Miscellaneous Parts

Rear Fan

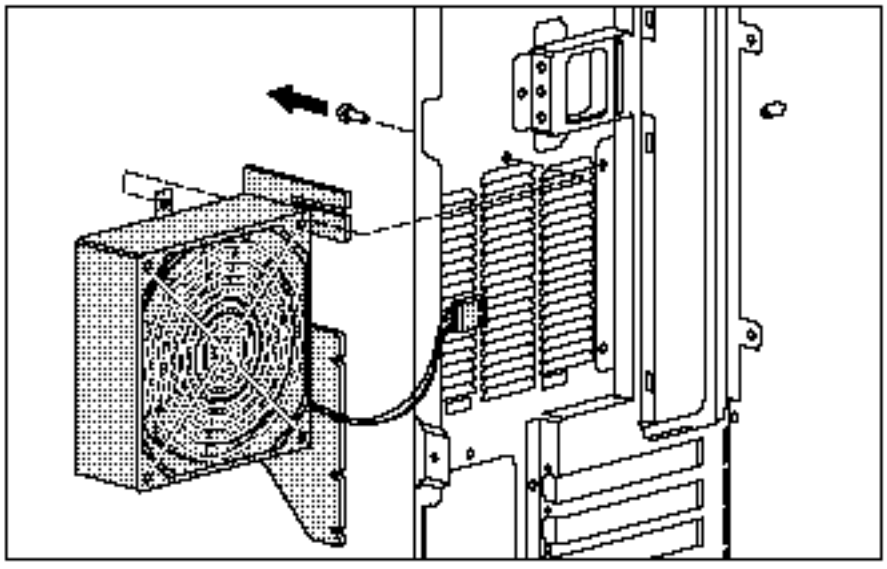

Figure 2-21. Removing the Rear Fan

1. Remove processor board(s) and memory expansion board.
2. Disconnect fan cable from the system board.
3. Remove retaining screw and lift fan out.
4. Remove plastic board guide and mount on replacement fan.
5. Reverse steps to replace rear cooling fan.

Lower Front Fan

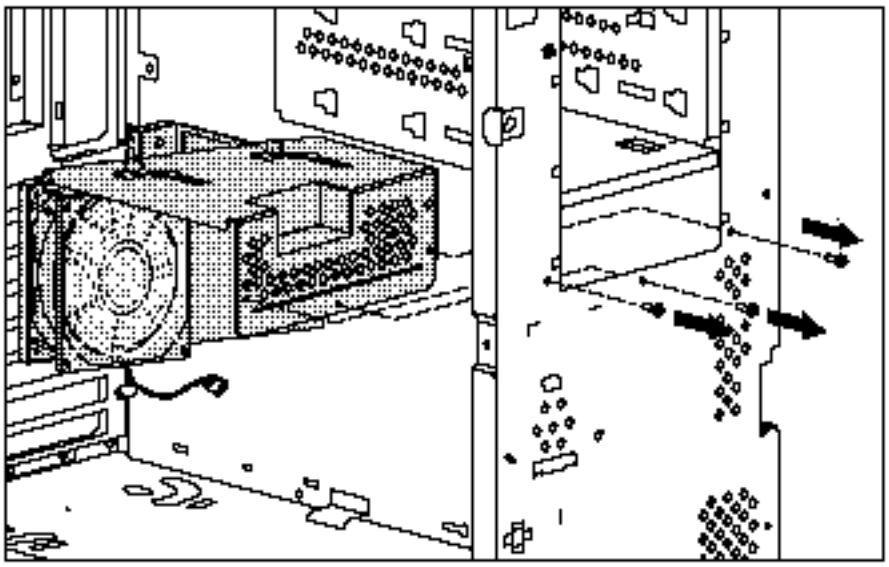

Figure 2-22. Removing the Lower Front Fan Assembly

1. Remove middle brace.
2. Remove processor board(s).
3. Disconnect fan cable from the system board.
4. Remove retaining screws (3).
5. Lift fan assembly out.
6. Reverse steps to replace fan assembly.

Plenum Fan

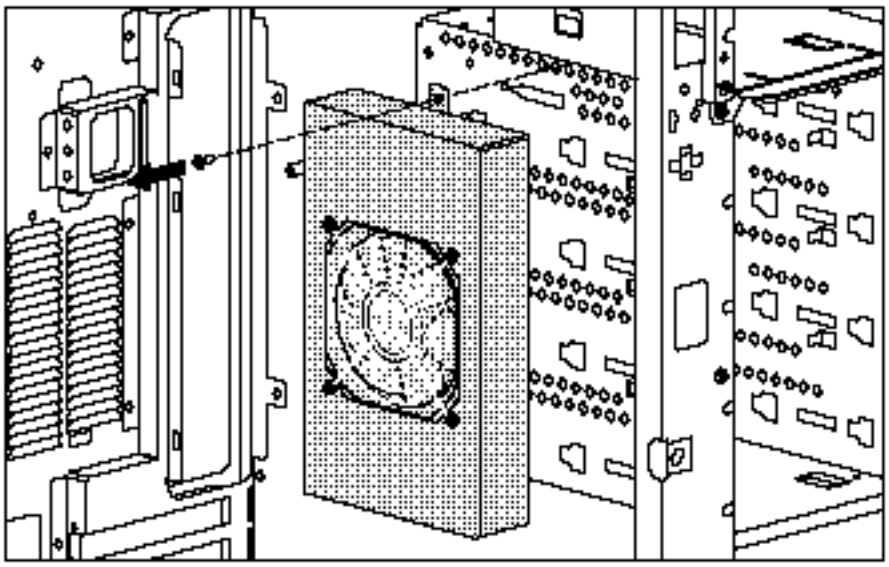

Figure 2-23. Removing the Plenum Fan

1. Disconnect fan cable from the backplane board.
2. Remove retaining screw.
3. Lift fan out.
4. Reverse steps to replace rear cooling fan.

Battery/Clock Module

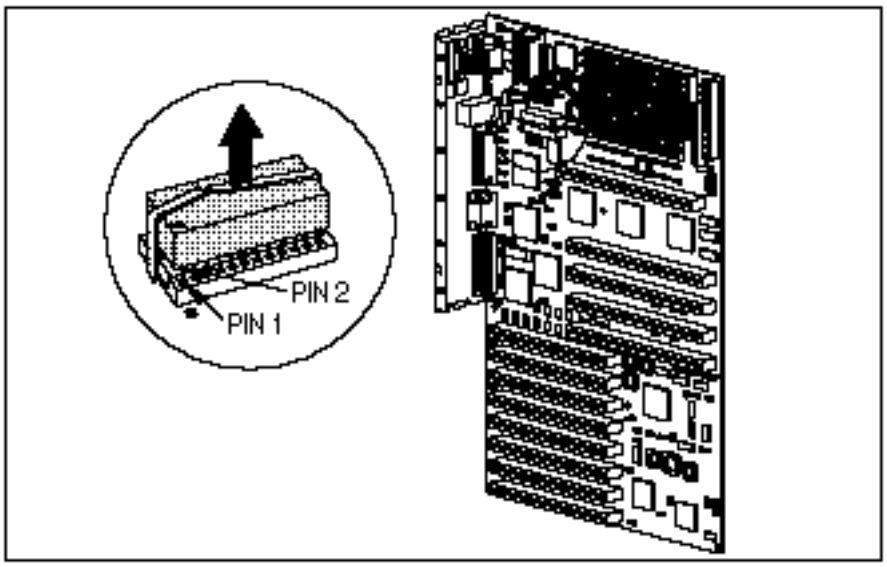

Figure 2-24. Removing the Battery/Clock Module

WARNING: The battery/clock module contains a lithium battery that may explode if mishandled. Do not abuse, recharge, disassemble, or dispose of in fire or heat above 90°C, incinerate, or expose to water or fire. Use only replacement battery/clock modules supplied by Compaq Computer Corporation (Part No. 149344-001). Disposal of the battery/clock module should be accomplished within compliance of local regulations or returned to Compaq Computer Corporation by established parts return methods.

NOTE: After replacing the battery, the Compaq System Configuration Utility must be run.

DIAGNOSTIC TOOLS

This chapter describes software and firmware diagnostic tools available for the Compaq Server products. These include:

- Power-On Self-Test (POST)
- Diagnostics (DIAGS)
- Drive Array Advanced Diagnostics (DAAD)
- Automatic Server Recovery
- ROMPaq utilities to upgrade flash ROMs

Utility Access

The SmartStart Installation Program CD contains the SmartStart program and many of the Compaq utilities needed to maintain your system, including:

- System Configuration Utility
- Drive Array Advanced Diagnostics Utility
- ROMPaq Firmware Upgrade Utilities

NOTE: The Diagnostics Utility is shipped on a separate diskette.

CAUTION: Do not select the "Automatic Configuration" when running the SmartStart Installation Program CD. This will result in data loss to the entire system.

There are several ways to access these utilities:

1. Run the Utilities on the System Partition.

   If the system was installed using the SmartStart utility, the Compaq utilities will automatically be available on the system partition. The system partition could also have been created during a manual system installation.

   To run the utilities on the system partition, boot the system and press **F10** when the cursor moves to the upper right corner of the screen. (If the cursor does not move to the upper right corner of the screen, the system partition does not exist.) Then select the utilities from the menu as described below. The ROMPaq Firmware Upgrade Utility is available under the "Diagnostics and Utilities" menu.

2. Run the Utilities on the System Diskette.

   The utilities can also be run from their individual diskettes. If you have a utility diskette newer than the version on the SmartStart CD, use that diskette.

   You may also create a diskette version of the utility from the SmartStart CD. To create diskette versions of the utilities from the CD:

   - Boot the SmartStart CD.
   - Select the "Manual Configuration and Server Utilities" button.

- Select the "Create Diskettes from CD" menu item.
- Select the diskette you would like to create from the list and follow the instructions on the screen to create the diskette.

3. Boot the SmartStart CD.
   - Select the "Manual Configuration and Server Utilities" button.
   - Select the utility wanted from the menu.
   - The System Configuration Utility is available under the "System Configuration" menu item.
   - The Drive Array Diagnostics Utility is available under the "Diagnostics and Utilities" menu.
   - The ROMPaq Firmware Upgrade Utilities can be run only from the System Partition or from the ROMPaq diskette. See steps 1 and 2.

POWER-ON SELF-TEST (POST)

POST is a series of diagnostic tests that run automatically on Compaq computers when the system is turned on. POST checks the following assemblies to ensure that the computer system is functioning properly:

- Keyboard
- Power supply
- System board
- Memory
- Memory expansion boards
- Controllers
- Diskette drives
- Hard drives

If POST finds an error in the system, an error condition is indicated by an audible and/or visual message. If an error code is displayed on the screen during POST or after resetting the system, follow the instructions in Table 3-1. The error messages and codes listed in Table 3-1 include all codes generated by Compaq products. Your system will generate only those codes that are applicable to your configuration and options.

Table 3-1
POST Error Messages

Error Code	Beeps	Probable Source of Problem	Action
A Critical Error occurred prior to this power-up	None	A catastrophic system error, which caused the server to crash, has been logged.	Run Diagnostics. Replace failed assembly as indicated.
101-ROM Error	1L,1S	System ROM checksum.	Run Diagnostics. Replace failed assembly as indicated or contact your service provider.
101-I/O ROM Error	None	Options ROM checksum.	Run Diagnostics. Replace failed assembly as indicated or contact your service provider.
102-System Board Failure	None	DMA, timers, etc.	Replace the system board. Run the Compaq System Configuration Utility.
104-ASR Timer Failure	None	System board failure.	Run Diagnostics.
162-System Options Not Set	2S	Configuration incorrect.	Run the System Configuration Utility and correct.
163-Time & Date Not Set	2S	Invalid time or date in configuration memory.	Run the System Configuration Utility and correct.
164-Memory Size Error	2S	Configuration memory incorrect.	Run the System Configuration Utility and correct.
170- Expansion Device Not Responding	None	EISA or PCI Expansion board failure.	Check board for secure installation. Replace the failed board if necessary.
172- Configuration Nonvolatile Memory Invalid	None	Nonvolatile configuration corrupt or jumper installed.	Run the System Configuration Utility and correct.
172-1 Configuration Nonvolatile Memory Invalid	None	Nonvolatile configuration corrupt.	Run the System Configuration Utility and correct.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
173- Slot ID Mismatch	None	Board replaced, but configuration not updated.	Run the System Configuration Utility and correct.
174- Configuration/Slot Mismatch Device Not Found	None	EISA or PCI board not found.	Run the System Configuration Utility and correct.
175- Configuration/Slot Mismatch Device Found	None	EISA or PCI board added, configuration not updated.	Run the System Configuration Utility and correct.
176-Slot with Not Readable ID Yields Valid ID	None	EISA or PCI board in slot that should contain an ISA board.	Run the System Configuration Utility and correct.
177-Configuration Not Complete	None	Incomplete System Configuration.	Run the System Configuration Utility and correct.
178-Processor Configuration Invalid	None	Processor type or step does not match configuration memory.	Run the System Configuration Utility and correct.
179-System Revision Mismatch	None	A board was installed that has a different revision date.	Run the System Configuration Utility and correct.
201-Memory Error	None	RAM failure.	Run Diagnostics.
203-Memory Address Error	None	RAM failure.	Run Diagnostics.
205-Cache Memory Error Option-Cache Memory Error	None	Cache memory error. Option Cache Memory Error.	Replace the processor board in the slot indicated. Replace the option cache board.
206-Cache Controller Error	None	Cache controller failure.	Run Diagnostics.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
207-Invalid Memory Configuration - Check SIMM Installation	None	Memory module installed incorrectly.	Verify placement of memory modules.
208-Invalid Memory Speed - Check SIMM Installation	1L,1S	The speed of the memory is too slow, where: xx00 = expansion board SIMMs are too slow, or 00yy = system board SIMMs are too slow. xx and yy have corresponding bit set.	The speed of the memory modules must be 60 or 70 ns. Verify the speed of the memory modules installed and replace.
211-Cache Switch Set Incorrectly	None	Switch not set properly during installation or upgrade.	Verify switch settings.
212-System Processor Failed/Mapped out	1S	Processor in slot x failed.	Run Diagnostics and replace failed processor.
213-Cache size Error (ProSignia VS only)	None	Invalid optional cache size.	Replace cache with 256K cache.
213-System Processor Not Installed	1S	System processor configured for slot indicated is missing.	Install processor in the slot indicated or run the System Configuration Utility to remove the processor from the *.CFG* file.
301-Keyboard Error	None	Keyboard failure.	Turn off the computer, then reconnect the keyboard.
301-Keyboard Error or Test Fixture Installed	None	Keyboard failure.	Replace the keyboard.
ZZ-301-Keyboard Error	None	Keyboard failure. (*ZZ* represents the Keyboard Scan Code.)	1. A key is stuck. Try to free it. 2. Replace the keyboard.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
303-Keyboard Controller Error	None	System board, keyboard, or mouse controller failure.	Check with your Authorized Compaq Reseller.
304-Keyboard or System Unit Error	None	Keyboard, keyboard cable, or system board failure.	1. Make sure the keyboard is attached. 2. Run Diagnostics to determine which is in error. 3. Replace the part indicated.
40X-Parallel Port X Address Assignment Conflict	2S	Both external and internal ports are assigned to parallel port X.	Run the System Configuration Utility.
402-Monochrome Adapter Failure	1L,2S	Monochrome display controller.	Replace the monochrome display controller.
501-Display Adapter Failure	1L,2S	Video display controller.	Replace the video board.
601-Diskette Controller Error	None	Diskette controller circuitry failure.	1. Make sure the diskette drive cables are attached. 2. Replace the diskette drive and/or cable. 3. Replace the system board.
605-Diskette Drive Type Error	2S	Mismatch in drive type.	Run the System Configuration Utility to set diskette type correctly.
702-A coprocessor has been detected that was not reported by CMOS.	None	Installed coprocessor not configured.	Run the System Configuration Utility and correct.
703-CMOS reports a coprocessor that has not been detected	2S	Coprocessor or configuration error.	1. Run the System Configuration Utility and correct. 2. Replace the coprocessor.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
1151-Com Port 1 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM1.	Run the System Configuration Utility and correct.
1152-Com Port 2, 3, or 4 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM2, COM3 or COM4.	Run the System Configuration Utility and correct.
1600-Server Manager/R Failure	None	Server Manager/R board failure. Error code displays after error message.	Run Diagnostics. Replace failed assembly as indicated or contact your service provider.
1610-Temperature violation detected. Waiting for system to cool	2S	Ambient system temperature too hot.	Check fan in system environment.
1611-Fan failure detected	2S	Required fan not installed or spinning.	Check fans.
1612-Primary power supply failure.	2S	Primary power supply has failed.	Replace power supply as soon as possible.
1730-Fixed Disk 0 does not support DMA Mode	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1731-Fixed Disk 1 does not support DMA Mode	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1740-Fixed Disk 0 failed Set Block Mode command	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1741-Fixed Disk 1 failed Set Block Mode command	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1750-Fixed Disk 0 failed Identify command	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1751-Fixed Disk 1 failed Identify command	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1760-Fixed Disk 0 does not support Block Mode	None	Fixed disk drive error.	Run the System Configuration Utility and correct.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
1761-Fixed Disk 1 does not support Block Mode	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1771-Primary Disk Port Address Assignment Conflict	None	Internal and external hard drive controllers are both assigned to the primary address.	Run the System Configuration Utility and correct.
1772-Secondary Disk Port Address Assignment Conflict	None	Address Assignment Conflict. Internal and external hard drive controllers are both assigned to the secondary address.	Run the System Configuration Utility and correct.
1773-Primary Fixed Disk Port Assignment Conflict	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1776-Drive Array - SCSI Port Termination Error	None	External and internal SCSI drives are both configured to Port 1.	Re-configure drives.
1777-Drive Array Error	None	Cooling fan failure, internal temperature alert or open cover.	Inspect for cooling fan failure or open cover.
1778-Drive Array resuming Automatic Data Recovery process	None	This message appears whenever a controller reset or power cycle occurs while Automatic Data Recovery is in progress.	No action necessary.
1779-Drive Array Controller detects replacement drives	None	Intermittent drive failure and/or possible loss of data.	If this message appears and drive *X* has not been replaced, this indicates an intermittent drive failure. This message also appears once immediately following drive replacement whenever data must be restored from backup.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
1780-Disk 0 Failure	None	Hard drive/format error.	Run Diagnostics. Replace failed assembly as indicated or contact your service provider.
1781-Disk 1 Failure	None	Hard drive/format error	Run Diagnostics. Replace failed assembly as indicated or contact your service provider.
1782-Disk Controller Failure	None	Hard disk drive circuitry error.	Run Diagnostics. Replace failed assembly as indicated or contact your service provider.
1784-Drive Array Drive Failure, Physical Drive	None	Defective drive and/or cables.	Check for loose cables. Replace defective drive *X* and/or cable(s).
1785-Drive Array not Configured	None	Configuration error.	Run the System Configuration Utility and correct.
1786-Drive Array Recovery Needed The following drive(s) need Automatic Data Recovery: Drive *X*. Select "F1" to continue with recovery of data to drive(s). Select "F2" to continue without recovery of data to drive(s).	None	Interim Data Recovery mode. Data has not been recovered yet.	Press **F1** key to allow Automatic Data Recovery to begin. Data will automatically be restored to drive *X* now that the drive has been replaced or now seems to be working. -Or- Press the **F2** key and the system will continue to operate in the Interim Data Recovery mode.
1787-Drive Array Operating in Interim Recovery Mode. Physical drive replacement needed: Drive *X*	None	Hard drive *X* failed or cable is loose or defective. Following a system restart, this message reminds you that drive *X* is defective and fault tolerance is being used.	1. Replace drive *X* as soon as possible. 2. Check loose cables. 3. Replace defective cables.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
*1788-Incorrect Drive Replaced: Drive *X* Drive(s) were incorrectly replaced: Drive *Y* Select "F1" to continue - drive array will remain disabled. Select "F2" to reset configuration - all data will be lost.	None	Drives are not installed in their original positions, so the drives have been disabled. *See* note below.	Reinstall the drives correctly as indicated. Press **F1** to restart the computer with the drive array disabled. -Or- Press **F2** to use the drives as configured and lose all the data on them.
***NOTE**: The 1788 error message might also be displayed inadvertently due to a bad power cable connection to the drive or by noise on the data cable. If this message was due to a bad power cable connection, but not due to an incorrect drive replacement, repair the connection and press **F2**. -Or- If this message was not due to a bad power cable connection, and no drive replacement took place, this could indicate noise on the data cable. Check cable for proper routing.			
1789-Drive Not Responding, Physical Drive Check cables or replace physical drive *X*. Select "F1" to continue - drive array will remain disabled. Select "F2" to fail drive(s) that are not responding - Interim Recovery Mode will be enabled if configured for fault tolerance.	None	Cable or hard drive failure.	1. Check the cable connections. 2. If cables are connected, replace the drive. 3. If you do not want to replace the drives now, press **F2**.
1790-Disk 0 Error	None	Hard drive error or wrong drive type.	Run the System Configuration Utility and Diagnostics and correct.
1791-Disk 1 Error	None	Hard drive error or wrong drive type.	Run the System Configuration Utility and Diagnostics and correct.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
1792-Drive Array Reports Valid Data Found in Array Accelerator. Data will automatically be written to drive array.	None	This indicates that while the system was in use, power was interrupted while data was in the Array Accelerator memory. Power was then restored within eight to ten days, and the data in the Array Accelerator was flushed to the drive array.	No action necessary; no data has been lost. Perform orderly system shutdowns to avoid data remaining in the Array Accelerator.
1793-Drive Array - Array Accelerator Battery Depleted - Data Lost (Error message 1794 also displays.)	None	This indicates that while the system was in use, power was interrupted while data was in the Array Accelerator memory. Array Accelerator batteries failed. Data in Array Accelerator has been lost.	Power was not restored within eight to ten days. Perform orderly system shutdowns to avoid data remaining in the Array Accelerator.
1794-Drive Array - Array Accelerator Battery Charge Low. Array Accelerator is temporarily disabled. Array Accelerator will be re-enabled when battery reaches full charge.	None	This is a warning that the battery charge is below 75%. Posted writes are disabled.	Replace the Array Accelerator board if batteries do not recharge within 36 power-on hours.
1795-Drive Array - Array Accelerator Configuration Error. Data does not correspond to this drive array. Array Accelerator is temporarily disabled.	None	This indicates that while the system was in use, power was interrupted while data was in the Array Accelerator memory. The data stored in the Array Accelerator does not correspond to this drive array.	1. Match the Array Accelerator to the correct drive array. -Or- 2. Run the System Configuration Utility to clear the data in the Array Accelerator.

Continued

POST Error Messages *Continued*

Error Code	Beeps	Probable Source of Problem	Action
1796-Drive Array - Array Accelerator Not Responding. Array Accelerator is temporarily disabled.	None	Array Accelerator is defective or has been removed.	1. Check that the Array Accelerator is properly seated. 2. Run the System Configuration Utility to re-configure the Compaq IDA-2 without the Array Accelerator.
1797-Drive Array - Array Accelerator Read Error Occurred. Data in Array Accelerator has been lost. Array Accelerator is disabled.	None	Hard parity error while reading data from posted writes memory.	Enable Array Accelerator.
1798-Drive Array - Array Accelerator Write Error Occurred. Array Accelerator is disabled.	None	Hard parity error while writing data to posted writes memory.	Enable Array Accelerator.
1799-Drive Array - Drive(s) Disabled due to Array Accelerator Data Loss. Select "F1" to continue with logical drives disabled. Select "F2" to accept data loss and to re-enable logical drives.	None	Volume failed due to loss of data in posted-writes memory.	Press **F1** to continue with logical drives disabled or **F2** to accept data loss and re-enable logical drive.
	2L,2S	Power is cycled. Temperature too hot. Processor fan not installed or spinning.	Check fans.
(Run System Configuration Utility = "F10" key)	None	A configuration error occurred during POST.	Press **F10** to run System Configuration Utility.
(RESUME = "F1" KEY)	None	As indicated to continue.	Press the **F1** key.

DIAGNOSTICS (DIAGS)

Diagnostic error codes occur if the system recognizes a problem while running the Diagnostics program. These error codes help identify possible defective subassemblies.

Tables 3-2 through 3-17 list possible error codes, a description of the error condition, and the action required to resolve the error condition.

In each case, the Recommended Action column lists the steps necessary to correct the problem. After completing each step, run the Diagnostics program to verify whether the error condition has been corrected. If the error code reappears, perform the next step, then run the Diagnostics program again. Follow this procedure until the Diagnostics program no longer detects an error condition.

If you encounter an error condition, complete the following steps before starting problem isolation procedures:

1. Ensure that there is proper ventilation. The computer should have approximately 12 inches (30.5 cm) clearance at the front and back of the system unit.
2. Turn off the computer and peripheral devices.
3. Disconnect any peripheral devices other than the monitor and keyboard. Do not disconnect the printer if you want to test it or use it to log error messages.
4. Delete the power-on password, if set. You will know that the power-on password is set when a key icon appears on the screen when POST completes. If this occurs, you must enter the password to continue. To delete the password, type the current password and press the **Enter** key.
5. If you do not have access to the password, you must disable the power-on password by using the Password Disable switch on the system board.
6. Install a loopback plug when instructed to by Diagnostics (Part Number 142054-001).
7. Run the latest version of Diagnostics.

Table 3-2
Primary Processor Test Error Codes

Error Code	Description	Recommended Action
101-xx	CPU test failed	Replace the processor board and re-test.
103-xx 104-xx 105-xx 106-xx	DMA page registers test failed Interrupt controller master test failed Port 61 error Keyboard controller self-test failed	Replace the processor board and re-test for error codes 103-xx through 106-xx.

Continued

Table 3-2 Primary Processor Test Error Codes *Continued*

Error Code	Description	Recommended Action
107-xx 108-xx 109-xx	CMOS RAM test failed CMOS interrupt test failed CMOS clock load data test failed	The following steps apply to error codes 107-xx through 109-xx. 1. Replace the battery/clock module and re-test. 2. Replace the system board and re-test.
110-xx 111-xx 112-xx 113-xx	Programmable timer load data test failed Refresh detect test failed Speed test slow mode out of range Protected mode test failed	Replace the system board and re-test for error codes 110-xx through 113-xx.
114-xx	Speaker test failed	The following steps apply to 114-xx error codes: 1. Verify the speaker connection and re-test. 2. Replace the speaker and re-test. 3. Replace the system board and re-test.
116-xx	Cache test failed	Replace the system board and re-test.
199-xx	Installed devices test failed	The following steps apply to 199-xx error codes: 1. Check the system configuration and re-test. 2. Verify cable connections and re-test. 3. Check switch and/or jumper settings and re-test. 4. Run the Configuration utility and re-test. 5. Replace the processor board and re-test. 6. Replace the system board and re-test.

Table 3-3
Memory Test Error Codes

Error Code	Description	Recommended Action
200-xx	Invalid memory configuration	Reinsert memory modules in correct location and re-test.
201-xx 202-xx	Memory machine ID test failed Memory system ROM checksum failed	The following steps apply to error codes 201-xx and 202-xx: 1. Replace the system ROM and re-test. 2. Replace the processor board and re-test. 3. Replace the memory expansion board and re-test.
203-xx 204-xx 205-xx 206-xx 210-xx	Memory write/read test failed Memory address test failed Walking I/O test failed Increment pattern test failed Random pattern test failed	The following steps apply to error codes 203-xx through 210-xx: 1. Replace the memory module and re-test. 2. Replace the processor board and re-test. 3. Replace the memory expansion board and re-test.

Table 3-4
Keyboard Test Error Codes

Error Code	Description	Recommended Action
301-xx 302-xx 303-xx 304-xx	Keyboard short test, 8042 self-test failed Keyboard long test failed Keyboard LED test, 8042 self-test failed Keyboard typematic test failed	The following steps apply to error codes 301-xx through 304-xx: 1. Check the keyboard connection. If disconnected, turn off the computer and connect the keyboard and re-test. 2. Replace the keyboard and re-test. 3. Replace the system board and re-test.

Table 3-5
Parallel Printer Test Error Codes

Error Code	Description	Recommended Action
401-xx	Printer failed or not connected	The following steps apply to error codes 401-xx through 498-xx: 1. Connect the printer and re-test. 2. Check the power to the printer and re-test. 3. Install the loopback connector and re-test. 4. Check the switch on the Serial/Parallel Interface board (if applicable) and re-test. 5. Replace the Serial/Parallel Interface board (if applicable) and re-test. 6. Replace the system board and re-test.
402-xx	Printer data register failed	
403-xx	Printer pattern test failed	
498-xx	Printer failed or not connected	

Table 3-6
Video Display Unit Test Error Codes

Error Code	Description	Recommended Action
501-xx	Video controller test failed	The following steps apply to error codes 501-xx through 516-xx: 1. Replace the monitor and re-test. 2. Replace the Advanced VGA board and re-test. 3. Replace the system board and re-test.
502-xx	Video memory test failed	
503-xx	Video attribute test failed	
504-xx	Video character set test failed	
505-xx	Video 80 x 25 mode 9 x 14 character cell test failed	
506-xx	Video 80 x 25 mode 8 x 8 character cell test failed	
507-xx	Video 40 x 25 mode test failed	
508-xx	Video 320 x 200 mode color set 0 test failed	
509-xx	Video 320 x 200 mode color set 1 test failed	
510-xx	Video 640 x 200 mode test failed	
511-xx	Video screen memory page test failed	
512-xx	Video gray scale test failed	
514-xx	Video white screen test failed	
516-xx	Video noise pattern test failed	

Table 3-7
Diskette Drive Error Test Codes

Error Code	Description	Recommended Action
600-xx	Diskette ID drive types test failed	The following steps apply to error codes 600-xx through 698-xx: 1. Replace the diskette and re-test. 2. Check and/or replace the diskette power and signal cables and re-test. 3. Replace the diskette drive and re-test. 4. Replace the system board and re-test.
601-xx	Diskette format failed	
602-xx	Diskette read test failed	
603-xx	Diskette write/read/compute test failed	
604-xx	Diskette random seek test failed	
605-xx	Diskette ID media failed	
606-xx	Diskette speed test failed	
607-xx	Diskette wrap test failed	
608-xx	Diskette write protect test failed	
609-xx	Diskette reset controller test failed	
610-xx	Diskette change line test failed	
694-xx	Pin 34 is not cut on 360 KB diskette drive	
697-xx	Diskette type error	
698-xx	Diskette drive speed not within limits	
699-xx	Diskette drive/media ID error	The following steps apply to 699-xx error codes: 1. Replace the media and re-test. 2. Run the Configuration utility and re-test.

Table 3-8
Monochrome Video Board Test Error Codes

Error Code	Description	Recommended Action
802-xx	Video memory test failed	The following steps apply to error codes 802-xx and 824-xx: 1. Replace monitor and re-test. 2. Replace the Advanced VGA board and re-test. 3. Replace monochrome board and re-test. 4. Replace the system board and re-test.
824-xx	Monochrome video text mode test failed	

Table 3-9
Serial Test Error Codes

Error Code	Description	Recommended Action
1101-xx	Serial port test failed	The following steps apply to error codes 1101-xx and 1109-xx: 1. Check the switch settings on the Serial/Parallel Interface board (if applicable) and re-test. 2. Replace the Serial/Parallel Interface board (if applicable) and re-test. 3. Replace the system board and re-test.
1109-xx	Clock register test failed	

Table 3-10
Modem Communications Test Error Codes

Error Code	Description	Recommended Action
1201-xx	Modem internal loopback test failed	The following steps apply to error codes 1201-xx through 1210-xx: 1. Refer to the modem documentation for correct setup procedures and re-test. 2. Check the modem line and re-test. 3. Replace the modem and re-test.
1202-xx	Modem time-out test failed	
1203-xx	Modem external termination test failed	
1204-xx	Modem auto originate test failed	
1206-xx	Dial multi-frequency tone test failed	
1210-xx	Modem direct connect test failed	

Table 3-11
Fixed Disk Drive Test Error Codes

Error Code	Description	Recommended Action
1700-xx	Fixed disk ID drive types test failed	The following steps apply to error codes 1700-xx through 1799-xx: 1. Run the Configuration Utility and verify the drive type. 2. Replace the fixed disk drive signal and power cables and re-test. 3. Replace the fixed disk drive controller and re-test. 4. Replace the fixed disk drive and re-test. 5. Replace the system board and re-test.
1701-xx	Fixed disk format test failed	
1702-xx	Fixed disk read test failed	
1703-xx	Fixed disk write/read/compare test failed	
1704-xx	Fixed disk random seek test failed	
1705-xx	Fixed disk controller test failed	
1708-xx	Fixed disk format bad track test failed	
1709-xx	Fixed disk reset controller test failed	
1710-xx	Fixed disk park head test failed	
1715-xx	Fixed disk head select test failed	
1716-xx	Fixed disk conditional format test failed	
1717-xx	Fixed disk ECC* test failed	
1719-xx	Fixed disk drive power mode test failed	
1736-xx	Drive Monitoring failed	
1799-xx	Invalid fixed disk drive type failed	

* Error Checking and Correcting

Table 3-12
CD-ROM Drive Test Error Codes

Error Code	Description	Recommended Action
1800-xx	CD-ROM ID failed	The following steps apply to error codes 1800-xx through 1823-xx: 1. Replace the CD-ROM and re-test. 2. Check and/or replace the signal cable and re-test. 3. Check the switch settings on the adapter board (if applicable). 4. Replace the tape adapter board (if applicable) and re-test. 5. Replace the CD-ROM drive and re-test. 6. Replace the system board and re-test.
1803-xx	CD-ROM Power failed	
1805-xx	CD-ROM Read failed	
1806-xx	CD-ROM SA/Media failed	
1808-xx	CD-ROM Controller failed	
1823-xx	CD-ROM random read failed	

Table 3-13
Tape Drive Test Error Codes

Error Code	Description	Recommended Action
1900-xx	Tape ID failed	The following steps apply to error codes 1900-xx through 1906-xx: 1. Replace the tape cartridge and re-test. 2. Check and/or replace the signal cable and re-test. 3. Check the switch settings on the adapter board (if applicable). 4. Replace the tape adapter board (if applicable) and re-test. 5. Replace the tape drive and re-test. 6. Replace the system board and re-test.
1901-xx	Tape servo write failed	
1902-xx	Tape format failed	
1903-xx	Tape drive sensor test failed	
1904-xx	Tape BOT/EOT test failed	
1905-xx	Tape read test failed	
1906-xx	Tape write/read/compare test failed	

Table 3-14
Advanced VGA Board Test Error Codes

Error Code	Description	Recommended Action
2402-xx	Video memory test failed	The following steps apply to error codes 2402-xx through 2456-xx: 1. Run the Configuration utility. 2. Replace the monitor and re-test. 3. Replace the Advanced VGA board or other video board and re-test. 4. Replace the system board and re-test.
2403-xx	Video attribute test failed	
2404-xx	Video character set test failed	
2405-xx	Video 80 x 25 mode 9 x 14 character cell test failed	
2406-xx	Video 80 x 25 mode 8 x 8 character cell test failed	
2407-xx	Video 40 x 25 mode test failed	
2408-xx	Video 320 x 320 mode color set 0 test failed	
2409-xx	Video 320 x 320 mode color set 1 test failed	
2410-xx	Video 640 x 200 mode test failed	
2411-xx	Video screen memory page test failed	
2412-xx	Video gray scale test failed	
2414-xx	Video white screen test failed	
2416-xx	Video noise pattern test failed	
2417-xx 2418-xx	Lightpen text mode test failed, no response	
2419-xx	ECG/VGC memory test failed	
2420-xx	ECG/VGC ROM checksum test failed	
2421-xx	ECG/VGC attribute test failed	
2422-xx	ECG/VGC 640 x 200 graphics mode test failed	
2423-xx	ECG/VGC 640 x 350 16-color set test failed	
2424-xx	ECG/VGC 640 x 350 64-color test failed	
2425-xx	ECG/VGC monochrome text mode test failed	
2431-xx	ECG/VGC monochrome graphics mode test failed	
2432-xx	640 x 480 graphics test failure	
2448-xx	320 x 200 graphics (256-color mode) test failure	
2451-xx	Advanced VGA Controller test failed	
2456-xx	132-column Advanced VGA test failed	
	Advanced VGA 256-Color test failed	

Continued

Table 3-14 Advanced VGA Board Test Error Codes *Continued*

Error Code	Description	Recommended Action
2458-xx	Advanced VGA Bit BLT Test	The following steps apply to error codes 2458-xx through 2480-xx: 1. Run Setup. 2. Replace the system board and re-test.
2468-xx	Advanced VGA DAC Test	
2477-xx	Advanced VGA Data Path Test	
2480-xx	Advanced VGA DAC Test	

Table 3-15
NetFlex-2 ENET-TR Controller and
NetFlex-2 Token Ring Controller Test Error Codes

Error Code	Description	Recommended Action
6000-xx	Network card ID failed	The following steps apply to error codes 6000-xx through 6089-xx: 1. Check the controller installation in the EISA slot. 2. Check the interrupt type and number setting. 3. Check the media connection at the controller and MAU*. 4. Check the media speed (4/16) and type (UTP/STP**) settings. 5. Check the MAU, cabling, or other network components. 6. Replace the controller.
6001-xx	Network card setup failed	
6002-xx	Network card transmit failed	
6014-xx	Network card Configuration failed	
6016-xx	Network card Reset failed	
6028-xx	Network card Internal failed	
6029-xx	Network card External failed	
6089-xx	Network card Open failed	
		* MAU = Multistation Access Unit ** UTP/STP = Unshielded Twisted Pair/Shielded Twisted Pair.

Table 3-16
Server Manager/R Board Test Error Codes

Error Code	Description	Recommended Action
7000-11	Processor (80186 Timer)	Replace the Server Manager/R board and re-test for error codes 7000-11 through 7000-27.
7000-12	Processor (80186 Registers)	
7000-13	Processor (Watch Dog Timer)	
7000-14	Processor (8570 RAM)	
7000-15	Processor (8570 RTC)	
7000-21	Memory	
7000-22	Memory Write/Read	
7000-23	Memory Address	
7000-24	Memory Refresh Alert	
7000-25	Memory Increment	
7000-26	Memory Random Data	
7000-27	Memory Disturb Address	
7000-28	Memory HBM	Replace the Server Manager/R board and re-test for error codes 7000-28 through 7000-46.
7000-33	HBM IO	
7000-34	HBM BMIC	
7000-35	HBM Video	
7000-41	ser_int	
7000-42	ser_int	
7000-43	ser_ext	
7000-44	ser_ext	
7000-45	ser_ext_int	
7000-46	ser_ext_int	
7000-51	mdm_int	Replace the Server Manager/R board Enhanced 2400-Baud Integrated Modem and re-test for error codes 7000-51 through 7000-57.
7000-52	mdm_int	
7000-53	mdm_ext	
7000-54	mdm_ext	
7000-55	mdm_ext_int	
7000-56	mdm_ext_int	
7000-57	mdm\c\analog	
7000-61	Voice/DTMF Internal Loopback	Replace the Server Manager/R board Voice ROM for 7000-61 and 7000-62 error codes.
7000-62	Voice/DTMF Internal Loopback	
7000-78	Host ADC Measurements	Replace the Server Manager/R board battery for 7000-78 and 7000-79 error codes.
7000-79	Battery	

Table 3-17
Pointing Device Interface Test Error Codes

Error Code	Description	Recommended Action
8601-xx	Pointing Device Interface test failed	The following steps apply for 8601-xx error codes: 1. Replace with a working pointing device and re-test. 2. Replace the system board and re-test.

DRIVE ARRAY ADVANCED DIAGNOSTICS (DAAD)

Drive Array Advanced Diagnostics (DAAD) is a DOS-based tool designed to run on all Compaq products that contain a Smart SCSI Array Controller using Fast-SCSI-2 Drives. The error messages and codes listed include all codes generated by Compaq products. Your system will generate only those codes that are applicable to your configuration and options. The two main functions of DAAD are to collect all possible information about the array controllers in the system and to offer a list of all detected problems.

> **NOTE:** Refer to the *Drive Array Advanced Diagnostics User Guide* for complete details and procedures about this diagnostic tool.

DAAD works by issuing multiple commands to the array controllers to determine if a problem exists. This data can then be saved to a file and, for severe situations, this file can be sent to Compaq for analysis. In most cases, DAAD will provide enough information to initiate problem resolution immediately.

> **NOTE:** DAAD does not write to the drives or destroy data. It does not change or remove configuration information.

Starting DAAD

To start DAAD:

1. Insert the DAAD diskette into drive A and reboot the system. If you are at the DOS prompt, enter the following:

   A:DAAD

2. A dialog box displays indicating the version of DAAD installed. Press the **Enter** key to continue.

   To exit without continuing, press the **Esc** key.

3. If you continue, a "Please Wait" panel will display indicating that DAAD is identifying the system parameters.

   DAAD gathers all the information it can from all of the array controllers in the system. The time it takes to gather this information depends on the size of your system.

> **CAUTION:** Do not cycle the power because the utility must perform low-level operations that, if interrupted, could cause the controller to revert back to a previous level of firmware if the firmware was soft-upgraded.

4. Another "Please Wait" panel will appear to indicate that the utility is identifying the ROM version. When this completes, the main DAAD screen will display.

> **NOTE:** To generate a DAAD report without starting the interactive portion of the utility, enter the following at the DOS prompt: DAAD *filename* where *filename* is the name of the file or report.

DAAD Diagnostic Messages

The following is a description of the diagnostic messages that may appear in the dialog box of the Diagnosis menu. Included with each message is a probable cause and a probable solution or troubleshooting routine.

To view the problems detected by DAAD, select the Diagnosis button. If DAAD found no problems, a message, "No Problems Detected," will display.

Accelerator board not detected

The IDA-2 board did not detect the presence of a configured array accelerator board.

Install an array accelerator board onto the IDA-2 controller. If you have an array accelerator board installed, check the seating to ensure that it has been properly installed onto the IDA-2 board. You may need to run the Compaq System Configuration Utility and disable the array accelerator board to get this message off the screen.

Accelerator error log

This is a list of the last 32 parity errors on transfers between the IDA-2 board transfer buffer and memory on the array accelerator board. The starting memory address, transfer count, and operation (read and write) displays.

If there are a number of these parity errors, you may need to replace the array accelerator board.

Accelerator parity read errors: *n*

This message displays the number of times that read memory parity errors were detected during transfers between the IDA-2 board transfer buffer and memory on the array accelerator board.

If there are a number of these parity errors, you may need to replace the array accelerator board.

Accelerator parity write errors: *n*

This message displays the number of times that write memory parity errors were detected during transfers between the IDA-2 board transfer buffer and memory on the array accelerator board.

If there are a number of these parity errors, you may need to replace the array accelerator board.

Accelerator status: Permanently disabled

The array accelerator board has been permanently disabled. It will remain disabled until it is reinitialized using the System Configuration Utility.

Check the Disable Code field. Run the System Configuration Utility to reinitialize the array accelerator board.

Accelerator status: Possible data loss in cache

Possible data loss was detected during power-up due to all of the batteries being below the sufficient voltage level and no presence of the identification signatures on the array accelerator board.

There is no way to determine if dirty or bad data was in the cache and is now lost.

Accelerator status: Temporarily disabled

The array accelerator board has been temporarily disabled.

Check the Disable Code field.

Accelerator status: Unrecognized status

A status returned from the array accelerator board that DAAD does not recognize.

Call your Authorized Compaq Reseller for the latest copy of DAAD.

Accelerator status: Valid data found at reset

Valid data was found in the posted write memory at re-initialization. The data will be flushed to disk.

This is *not* an error or data loss condition. No action needs to be taken.

Accelerator status: Warranty alert

A catastrophic problem has occurred with the array accelerator board. Refer to the other messages on the Diagnostics screen for the exact meaning of this message.

Replace the array accelerator board.

Battery pack *X* below reference voltage

The indicated battery pack is below the required voltage levels.

Allow sufficient time for the batteries to recharge (36 hours). If the batteries have not recharged after 36 hours, replace the battery pack.

Battery *X* not fully charged

The battery is not fully charged.

If 75% of the batteries present are fully charged, the array accelerator is fully operational. If more than 75% of the batteries are *not* fully charged, allow 36 hours to recharge them.

Board not attached

The IDA-2 board has been configured for use with an array accelerator board, but one is currently not attached.

Locate the original array accelerator board and attach it to the IDA-2 board.

CMOS present, controller not detected

EISA nonvolatile RAM has a configuration for an array controller but there is no board in this slot. Either a board has been removed from the system or a board has been placed in the wrong slot.

Place the array controller in the proper slot or run the System Configuration Utility to re-configure nonvolatile RAM to reflect the removal or new position.

Compatibility port problem detected

You have the compatibility port configured for this IDA controller. When DAAD was verifying this interface, a serious problem was detected.

A hardware problem has occurred and you should replace the IDA controller.

Configuration signature is zero

DAAD detected that nonvolatile RAM contains a configuration signature that is zero. Old versions of the System Configuration Utility could cause this.

Run the latest version of System Configuration Utility to configure the controller and nonvolatile RAM.

Configuration signature mismatch

The array accelerator board has been configured for a different IDA-2 board. The configuration signature on the array accelerator board does not match the one stored on the IDA-2 board.

To recognize the array accelerator board, run the System Configuration Utility.

Controller communication failure occurred

DAAD was unable to successfully issue commands to the controller in this slot.

Controller detected. CMOS not present

The EISA nonvolatile RAM is not configured.

Run the System Configuration Utility to configure the nonvolatile RAM.

Controller firmware needs upgrading

The controller firmware is below the latest recommended version.

Call your Authorized Compaq Reseller to obtain the latest upgraded firmware.

Controller firmware needs upgrading (DAAD Error 102)

You have the correct controller, however, the IDA firmware should be greater than 1.26.

Call your Authorized Compaq Reseller to obtain the latest firmware.

Controller is not configured

The controller is not configured. If the controller was previously configured and you change drive locations, there may be a problem with the placement of the drives. DAAD examines each physical drive and looks for drives that have been moved to a different drive bay.

Look for the messages that indicate which drives have been moved. If none appear and drive swapping did not occur, run the System Configuration Utility to configure the controller and nonvolatile RAM. *Do not* run the System Configuration Utility if you believe drive swapping has occurred.

Controller needs replacing (DAAD Error 102)

The IDA firmware is less than version 0.96.

Replace the controller as soon as possible.

Controller needs replacing (DAAD Error 104)

The Intelligent Array Expansion System firmware is less than version 1.14.

Replace the controller as soon as possible.

Controller reported POST error. Error Code: *x*

The controller returned an error from its internal Power-On Self Tests.

Replace the controller.

Controller restarted with a signature of zero

DAAD did not find a valid configuration signature to use to get the data. Nonvolatile RAM may not be present (unconfigured) or the signature present in nonvolatile RAM may not match the signature on the controller.

Run the System Configuration Utility to configure the controller and nonvolatile RAM.

Disable command issued

Posted writes have been disabled by the issuing of the Accelerator Disable command. This occurred because of an operating system device driver.

Restart the system. Run the System Configuration Utility to reinitialize the array accelerator board.

Drive (bay) *X* needs replacing (DAAD Error 102)

The 210-megabyte hard drive installed in the computer has firmware version 2.30 or 2.31.

Replace the drive.

Drive Monitoring features are unattainable

DAAD was unable to get the monitor and performance data due to a fatal command problem such as drive time-out, or was unable to get the data due to these features not being supported on the controller.

Check for other errors (time-outs, etc.). If no other errors occur, upgrade the firmware to a version that supports monitor and performance, if desired.

Drive Monitoring is NOT enabled for drive bay *X*

The monitor and performance features have not been enabled.

Run the Compaq Diagnostics Utility 8.05 or higher to initialize the monitor and performance features.

Drive time-out occurred on physical drive bay *X*

DAAD issued a command to a physical drive and the command was never acknowledged.

The drive or cable may be bad. Check the other error messages on the Diagnostics screen to determine resolution.

Drive (bay) *X* firmware needs upgrading

The firmware on this physical drive is below the latest recommended version.

Call your Authorized Compaq Reseller to obtain the latest upgraded firmware.

Drive (bay) *X* has invalid M&P stamp

The physical drive has invalid monitor and performance data present.

Run the latest Compaq Diagnostics Utility to properly initialize this drive.

Drive *X* indicates position *Y*

This message indicates which physical drive appears to be scrambled or in the wrong drive bay that it was originally configured for.

Examine the graphical drive representation on DAAD to determine proper drive locations. Remove drive X and place it in drive position Y. Rearrange the drives according to the DAAD instructions.

Drive (bay) *X* RIS copy mismatch

The copies of the RIS on this drive do not match.

This drive may need to be replaced. Check for other errors.

Drive (bay) *X* upload code not readable

An error occurred while DAAD was trying to read the upload code information from this drive.

If there were multiple errors, this drive may need to be replaced.

Duplicate write memory error

Data could not be written to the array accelerator board in duplicate due to the detection of parity errors. This is *not* a data loss situation.

Replace the array accelerator board.

Error occurred reading RIS copy from drive (bay) *X*

An error occurred while DAAD was trying to read the RIS from this drive.

If there were multiple errors, this drive may need to be replaced.

FYI: Drive (bay) *X* is non-Compaq supplied

The installed drive was not supplied by Compaq.

If problems exist with this drive, replace it with a Compaq drive.

Identify controller data did not match with CMOS

The identify controller data from the array controller did not match with the information stored in nonvolatile RAM. This could occur if new, previously configured drives have been placed in a system that has also been previously configured. It could also occur if the firmware on the controller has been upgraded and the System Configuration Utility was not run.

Check the identify controller data under the Inspect Utility. If the firmware version field is the only thing different between the controller and nonvolatile RAM data, this is not a problem. Otherwise run the System Configuration Utility.

Identify logical drive data did not match with CMOS

The identify unit data from the array controller did not match with the information stored in nonvolatile RAM. This could occur if new, previously configured drives have been placed in a system that has also been previously configured.

Run the System Configuration Utility to configure the controller and nonvolatile RAM.

Insufficient adapter resources

The adapter does not have sufficient resources to perform operations to the array accelerator board. Drive rebuild may be occurring.

Operate the system without the array accelerator board until the drive rebuild completes.

Less than 75% batteries at sufficient voltage

The operation of the array accelerator board has been disabled due to less than 75% of the battery packs being at the sufficient voltage level.

Allow sufficient time for the batteries to recharge (36 hours). If the batteries have not recharged after 36 hours, replace the array accelerator board.

Logical drive *X* failed due to cache error

This logical drive failed due to a catastrophic cache error.

Replace the array accelerator board and re-configure using the System Configuration Utility.

Logical Drive *X* status = FAILED

This status could be issued for several reasons. If this logical drive is configured for No Fault Tolerance and one or more drives fail, this status will occur. If mirroring is enabled, and any two mirrored drives fail, this status will occur. If Data Guarding is enabled, and two or more drives fail in this unit, this status will occur. This status may also occur if another configured logical drive is in the WRONG DRIVE REPLACED or LOOSE CABLE DETECTED state.

Check for drive failures, wrong drive replaced, or loose cable messages. If there was a drive failure, replace the failed drive(s) and then restore the data for this logical drive from the tape backup. Otherwise, follow the wrong drive replaced or loose cable detected procedures.

Logical Drive *X* status = INTERIM RECOVERY

A physical drive in this logical drive has failed. The logical drive is operating in interim recovery mode and is vulnerable.

Replace the failed drive as soon as possible.

Logical Drive *X* status = LOOSE CABLE DETECTED

A physical drive has a cabling problem.

Turn the system off and attempt to reattach the cable onto the drive. If this does not work, replace the cable.

Logical Drive *X* status = NEEDS RECOVER

A physical drive in this logical drive has failed and has now been replaced. This drive needs to be rebuilt from the mirror drive or the parity data.

When booting up the system, select the "F1 - rebuild drive" option to rebuild the replaced drive.

Logical Drive *X* status = OVERHEATED

The temperature of the Intelligent Array Expansion System drives is beyond safe operating levels and it has shut down to avoid damage.

Check the fans and the operating environment.

Logical Drive *X* status = OVERHEATING

The temperature of the Intelligent Array Expansion System drives is beyond safe operating levels.

Check the fans and the operating environment.

Logical Drive *X* status = RECOVERING

A physical drive in this logical drive has failed and has now been replaced. The replaced drive is rebuilding from the mirror drive or the parity data.

Nothing needs to be done. Normal operations can occur.

Logical Drive *X* status = WRONG DRIVE REPLACED

A physical drive in this logical drive has failed. The incorrect drive was replaced.

Replace the drive that was incorrectly replaced. Then, replace the original drive that failed with a new drive. *Do not* run the System Configuration Utility to re-configure - you will lose data on the drive.

Mirror data miscompare

Data was found at re-initialization in the posted write memory, however, the mirror data compare test failed resulting in data being marked as invalid. Data loss is possible.

Replace the array accelerator board.

Mirrored memory location errors

Soft errors occurred when attempting to read the same data from both sides of the mirrored memory. Data loss will occur.

Replace the array accelerator board.

No configuration for Accelerator Board

The array accelerator board has not been configured.

If the array accelerator board is present, run the System Configuration Utility to configure the board.

Physical Drive (bay) *X* error occurred

This message displays detailed information on any drive errors that were returned to DAAD while issuing drive commands.

Check for other error conditions.

Physical drive (bay) *X* has loose cable

The array controller could not communicate with this drive at power-up. This drive has not previously failed.

Check all cable connections first. The cables could be bad, loose, or disconnected. Turn on the system and attempt to reconnect data/power cable to the drive. If this does not work, replace the cable. If that does not work, the drive may need to be replaced.

Physical drive (bay) *X* is a replacement drive

This drive has been replaced. This message displays if a drive is replaced in a fault tolerant logical volume.

If the replacement was intentional, allow the drive to rebuild.

Physical drive (bay) *X* is a replacement drive marked OK

This drive has been replaced and marked OK by the firmware. This may occur if a drive has an intermittent failure (for example, if a drive has previously failed, then when DAAD is run, the drive starts working again).

Replace the drive.

Physical drive (bay) *X* has failed

The indicated physical drive has failed.

Replace this drive.

Physical drive (bay) *X* is undergoing drive recovery

This drive is being rebuilt from the corresponding mirror or parity data.

Normal operations should occur.

Physical drive (bay) *X* was inadvertently replaced

The physical drive was incorrectly replaced after another drive failed.

Replace the drive that was incorrectly replaced and replace the original drive that failed. Do not run the System Configuration Utility and try to re-configure - data will be lost.

Set configuration command issued

The configuration of the IDA-2 has been updated. The array accelerator board remains disabled until it is reinitialized.

Run the System Configuration Utility to reinitialize the array accelerator board.

Soft Firmware Upgrade required

DAAD has determined that your controller is running firmware that has been soft upgraded by the Compaq Upgrade Utility. However, the firmware running is not present on all drives. This could be caused by the addition of new drives in the system.

Run the Compaq Upgrade Utility to place the latest firmware on all drives.

Threshold for drive (bay) *X* violated

This message indicates that a monitor and performance threshold for this drive has been violated.

Check for the particular threshold that has been violated.

Threshold violations for drive (bay) *X*

This is a list of the individual thresholds that have been violated for this drive.

The drive may need to be replaced. Run the Compaq Diagnostics Utility to determine if the drive has been initialized and the threshold violation warrants drive replacement.

Unknown disable code

A code was returned from the array accelerator board that DAAD does not recognize.

Call your Authorized Compaq Reseller for the latest version of DAAD.

Warning bit detected

A monitor and performance threshold violation may have occurred. The status of a logical drive may not be OK.

Check the other error messages for an indication of the problem.

Wrong Accelerator

This could mean that either the board was replaced in the wrong slot or placed in a system that was previously configured with another board type. Included with this message is a message indicating the type of adapter sensed by DAAD and a message indicating the type of adapter last configured in EISA nonvolatile RAM.

Check the diagnosis screen for other error messages. Run the System Configuration Utility to update the system configuration.

RAPID RECOVERY SERVICES

The Compaq ProLiant provides rapid recovery services for diagnosing and recovering from errors. These tools are available for local and remote diagnosis and recovery. The following topics are discussed here:

- Automatic Server Recovery (ASR)
- Server Health Logs
- System Configuration History Files

NOTE: Please refer to the Compaq *On-line Help* for complete details and procedures about this diagnostic tool.

Automatic Server Recovery

The Automatic Server Recovery (ASR) feature can be optionally enabled to restart a Server after a critical hardware or software error has occurred. If a critical error occurs, the Server will record the error information in the Server Health Logs, reboot the system, and initiate a call to a pager. The system can be configured for either automatic recovery or for attended local or remote access to diagnostic and configuration tools.

NOTE: ASR is available only under operating systems using the ASR drivers provided by Compaq.

The following chart explains how ASR works:

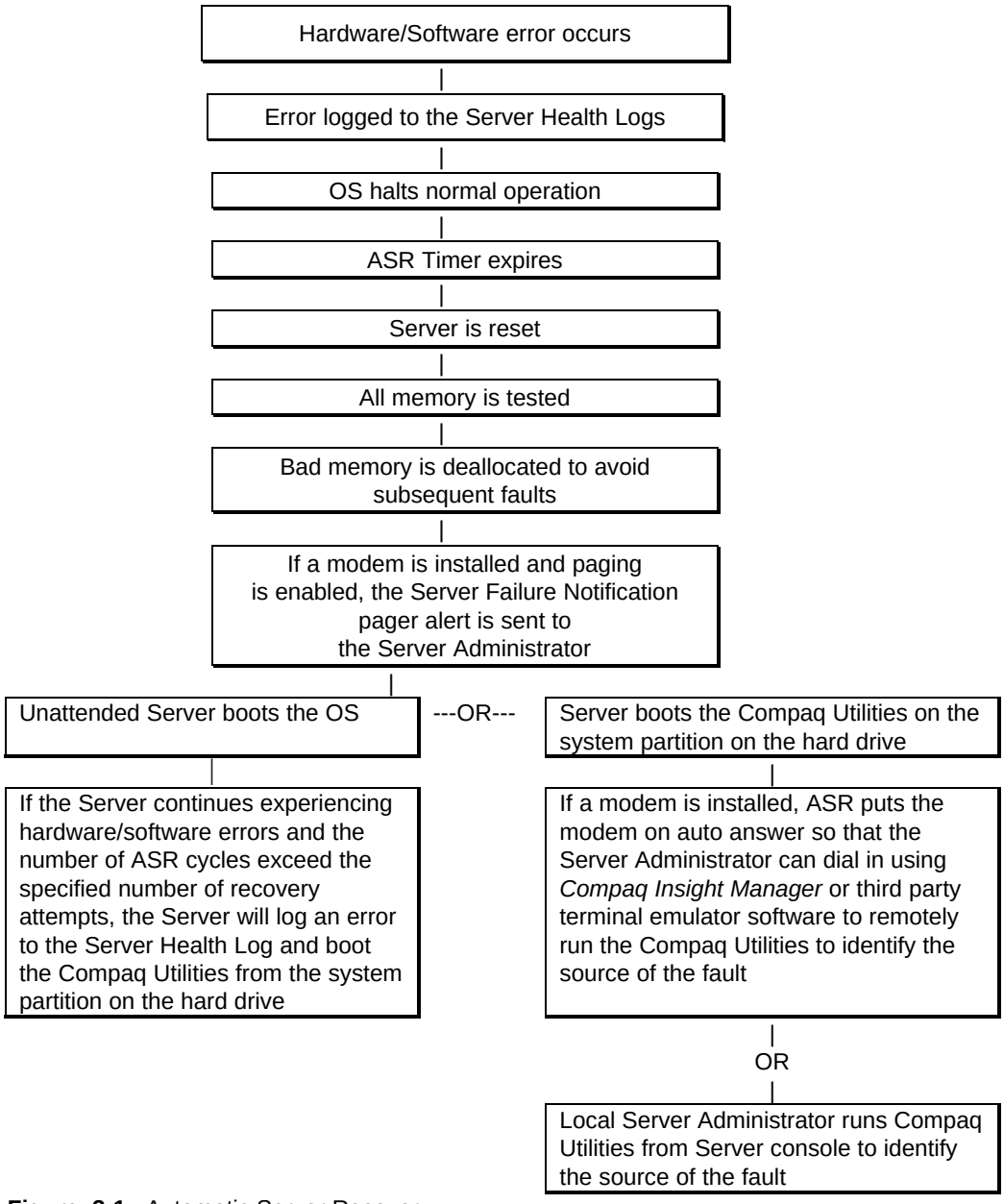
Hardware/Software error occurs
Error logged to the Server Health Logs
OS halts normal operation
ASR Timer expires
Server is reset
All memory is tested
Bad memory is deallocated to avoid subsequent faults
If a modem is installed and paging is enabled, the Server Failure Notification pager alert is sent to the Server Administrator
Unattended Server boots the OS
---OR---
Server boots the Compaq Utilities on the system partition on the hard drive
If the Server continues experiencing hardware/software errors and the number of ASR cycles exceed the specified number of recovery attempts, the Server will log an error to the Server Health Log and boot the Compaq Utilities from the system partition on the hard drive
If a modem is installed, ASR puts the modem on auto answer so that the Server Administrator can dial in using *Compaq Insight Manager* or third party terminal emulator software to remotely run the Compaq Utilities to identify the source of the fault
OR
Local Server Administrator runs Compaq Utilities from Server console to identify the source of the fault

Figure 3-1. Automatic Server Recovery.

Configuring the Server for Automatic Server Recovery (ASR)

When setting up the Server to use Automatic Server Recovery (ASR), you must set the ASR Timer, select the pager number to call, specify how you want the Server to recover from critical system faults, and specify when to monitor. This selection process is accomplished through the SmartStart installation process and can be modified through the Compaq System Configuration Utility.

The ASR depends on an operating system driver that routinely notifies the ASR hardware that the system is operating properly. You should set the ASR Timer to allow the ASR to wait a reasonable period of time before resetting the system and activating the recovery process after a fault occurs. If the time between ASR notifications by the driver exceeds the specified time period, it will assume a fault has occurred and initiate the recovery process.

For example, if the ASR Timer is set to 10 minutes, the system will not reset the Server unless 10 minutes elapses with no notification from the driver that the system is operating properly.

You can select to be paged (modem required) and what mode the Server will be in when it restarts after a critical error. The following sections describe the different reboot options and the system requirements for each level.

Unattended Recovery

For unattended recovery, ASR will log the error information to the Critical Error Log, reset the Server, test all memory, automatically de-allocate any bad memory blocks found, page you (if modem is present and paging is selected), and attempt to reboot the operating system. Often the Server will restart successfully, making this the ideal choice for remote locations where trained service personnel are not immediately available.

The ASR will only attempt the recovery process a limited number of times. If the Server continues to experience hardware/software errors and the number of recovery cycles exceed the retry limit, the Server will log an error to the Critical Error Log and continue to boot the Compaq Utilities from the hard drive.

The requirements to use this level of the ASR feature are:

- Operating System with ASR support
- ASR configured to load the operating system after reboot
- Optional Hayes-compatible modem (only required for paging)

Attended Recovery

For local or remote installations where it is desirable to supervise the recovery, ASR will log the error information to the Critical Error Log, reset the Server, test all memory, automatically de-allocate any bad memory blocks found, page you, boot the Compaq Utilities from the hard drive, and place the modem in auto answer mode. These utilities are placed on a special system utilities partition on the hard drive during the system configuration process. If a modem with an auto-answer feature is installed, you can dial in and remotely diagnose or re-configure the Server; otherwise, this can be done from the Server console. The requirements to use this level of the ASR feature are:

- Operating System with ASR support
- System Configuration Utility and Diagnostics Utility installed on the system partition of the hard drive
- ASR configured to load the Compaq Utilities after reboot
- Optional Hayes-compatible modem with auto-answer feature (only required for remote operations and paging)

For remote operations, the administrator must have access to Compaq Insight Manager or a communications software package capable of terminal emulation to a local terminal with VT100 or ANSI terminal capabilities.

NOTE: If the remote site is using something other than VT100 or an ANSI terminal emulator, it is still possible to configure remotely as long as the package contains either an ANSI terminal or VT100 terminal emulator set for 8 data bits, 1 stop bit, and no parity. However, additional setup not outlined in this document may be required, and functionality may be reduced.

ASR Security

The standard Compaq ProLiant security password features function differently during Automatic Server Recovery-2 than during a typical system startup.

During ASR the system will not prompt for the Power-On Password. This allows the ASR to restart the Operating System or Compaq Utilities without user intervention.

To maintain system security, the Server should be set to boot in Network Server Mode (an option in the System Configuration Utility). This option ensures that the Server keyboard is locked until you enter the Keyboard Password.

You should also select an Administrator Password (an option in the System Configuration Utility). During attended ASR (local or remote), you must enter this Administrator Password before any modifications can be made to the Server configuration.

Server Health Logs

The Server Health Logs contain information to help identify and correct any Server failures and correlate hardware changes with Server failure. The Server Health Logs are stored in nonvolatile RAM and consist of the Critical Error Log and the Revision History Table.

If errors occur, information about the errors is automatically stored in the Critical Error Log.

Whenever boards or components (that support revision tracking) are updated to a new revision, the Revision History Table will be updated.

Critical Error Log

The Critical Error Log records noncorrectable memory errors as well as catastrophic hardware and software errors that typically cause the system to fail. This information helps you quickly identify and correct the problem, minimizing downtime.

The log can be viewed through Inspect Utility, Diagnostics Utility, Compaq Insight Manager, or the optional Server Manager/R. The Diagnostics Utility either resolves the error or suggests corrective action.

The Critical Error Log identifies and records all the following errors. Each error type is briefly explained below. When any of these errors are encountered, you should run the Diagnostics Utility.

Table 3-18
Critical Error Log Error Messages

Error Message	Description
Automatic Server Recovery Base Memory Parity Error	The system detected a data error in base memory following a reset due to the Automatic Server Recovery (ASR) Timer expiration.
Automatic Server Recovery Extended Memory Parity Error	The system detected a data error in extended memory following a reset due to the ASR Timer expiration.
Automatic Server Recovery Memory Parity Error	The system ROM was unable to allocate enough memory to create a stack. Then, it was unable to put a message on the screen or continue booting the Server.
Automatic Server Recovery Reset Limit Reached	The maximum number of system resets due to the ASR timer expiration has been reached, resulting in the loading of Compaq Utilities.
Error Detected On Boot Up	The Server detected an error during the Power-On Self-Test.

Continued

Table 3-18 Critical Error Log Error Messages *Continued*

Error Message	Description
NMI - Expansion Board Error	A board on the expansion bus indicated an error condition, resulting in a Server failure.
NMI - Expansion Bus Master Time-Out	A bus master type expansion board in the indicated slot did not release the bus after its maximum time, resulting in a Server failure.
NMI - Expansion Bus Slave Time-Out	A board on the expansion bus delayed a bus cycle beyond the maximum time, resulting in a Server failure.
NMI - Fail-Safe Timer Expiration	Software was unable to reset the system fail-safe timer, resulting in a Server failure.
Processor Exception	The indicated processor exception occurred.
NMI - Processor Parity Error	The processor detected a data error, resulting in a Server failure.
Server Manager Failure	An error occurred in the Server interface with the Server Manager/R.
NMI - Software Generated Interrupt Detected Error	Software indicated a system error, resulting in a Server failure.

Revision History Table

Some errors can be resolved by reviewing changes to the Compaq ProLiant configuration. The Server has an Automatic Revision Tracking (ART) feature that helps you review recent changes to the Server's configuration.

One ART feature is the Revision History Table, which contains the hardware version number of the system board and any other EISA or PCI boards providing ART-compatible revision information. The Revision History is provided in the following format in Table 3-19.

Table 3-19
Revision History Format

	Values
Functional Revision Level	A to BC
Assembly Version	1 = Original Assembly 2 = Second Generation Assembly 3 = Third Generation Assembly 4 = Fourth Generation Assembly

The Revision History Table is stored in nonvolatile RAM and is accessed through Diagnostics, Inspect, Compaq Insight Manager, and the optional Compaq Server Manager/R.

The Revision History Table feature allows precise identification of the components in a Server. The table is updated when the system ROM detects a board version change in an EISA or PCI

expansion slot. The table also contains complete version information on the previous configuration. This feature allows correlation of hardware changes with Server failure. The following information is stored in the Revision History Table:

- Type of board (System, EISA, or PCI)
- Slot number
- Expansion board ID
- Version

System Configuration History Files

The System Configuration History Files, part of the ART feature, allow you to review modifications to the system configuration.

If a change has been made to the configuration file, the System Configuration Utility will keep a history of the system configuration file. The System Configuration Utility stores the three most recent configurations.

The most recent configuration of the System Configuration History Log can be displayed and printed using the Inspect Utility. All three versions can be printed for historical purposes or reinstalled through the Maintain Configuration Utility feature of the System Configuration Utility.

ROMPaq

The use of flash ROM in the Compaq ProLiant and in certain options controllers allows the firmware (BIOS) to be upgraded with system or option ROMPaq utilities. To upgrade the ROM, insert the ROMPaq diskette into drive A and cold boot the system. The ROMPaq utility will then check the system and provide a choice (if more than one exists) of ROM revisions that the system can be upgraded to. This procedure is the same for both system and option ROMPaq utilities.

CAUTION: Do not turn the power off during a firmware upgrade. A loss of power during upgrade may corrupt the upgrade.

SWITCH AND JUMPER INFORMATION

This chapter provides switch and jumper information for the Compaq ProLiant 4500 Server.

System Board

Switch SW1 is a six-position switch bank (S1-S6) that controls the security features and configuration of the computer.

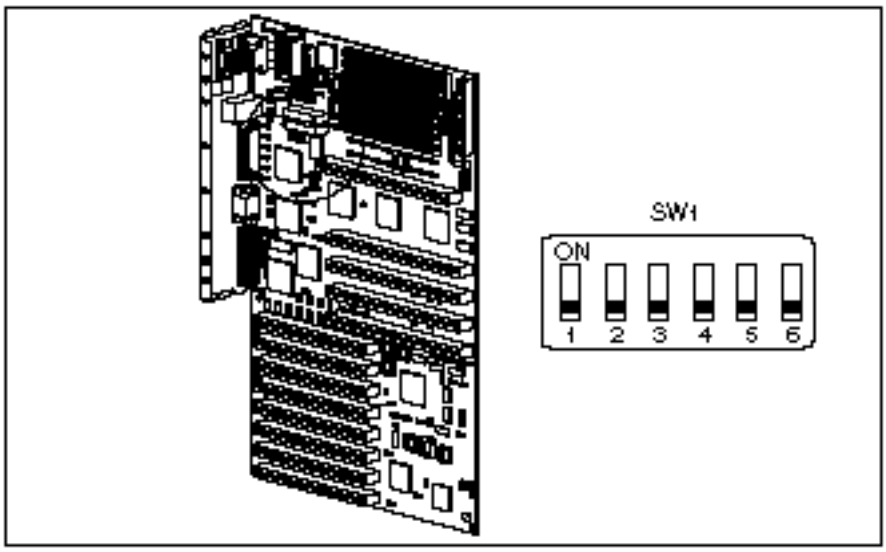

Figure 4-1. Location of ProLiant 4500 System Board Switches

System Maintenance Switch SW1

The following table defines the function for each switch setting of SW1. The default positions are indicated below.

Table 4-1
System Maintenance Switch Settings - SW1

Switch	Function	Set to ON	Set to OFF
1	**Video Disable**	Disables the integrated video controller	*Default*. Enables the integrated video controller
2	**Configuration Lock**	Disables configuration changes	*Default*. Enables configuration changes
3	**Chassis**	System is installed in a rack chassis	*Default*. System is installed in a tower chassis
4	**Diskette Boot Override**	Enables system booting from the diskette drive regardless of the configuration setting	*Default*. System booting from the diskette drive is controlled by the configuration settings.
5	**Power-On Password**	Clears passwords	*Default*. System booting is password protected if a password is set.
6	**Configuration Memory Clear**	Clears the configuration memory	*Default*.

SCSI Devices

The Pluggable Fast-Wide SCSI-2 and the Fast-SCSI-2 hard drives automatically set the SCSI ID when plugged into the ProLiant 4500 Server. If the drives are part of a fault tolerant configuration, the replaced drive will automatically begin rebuilding when it is installed.

NOTE: It is not necessary to set the SCSI ID jumpers on a replacement drive. The SCSI ID is set automatically by the backplane board when the drive is installed.

The 32-Bit Fast-Wide SCSI-2 and the Fast-SCSI-2 Controller requires that a SCSI ID be set for each SCSI device. The SCSI ID is set by jumpers ID2, ID1, and ID0 located on each SCSI device. Table 4-2 shows the jumper settings for each SCSI ID and its recommended drive bay. The following figure shows the physical locations of jumpers ID2, ID1, and ID0 on supported options.

Table 4-2
Jumper Settings For SCSI ID

Device in Drive Bay	SCSI ID	Pin 3 ID2	Pin 2 ID1	Pin 1 ID0
6	6	ON	ON	OFF
5	5	ON	OFF	ON

NOTE: SCSI IDs for bays 0-3 are preset to 0-3 respectively. No two drives can have the same SCSI ID.

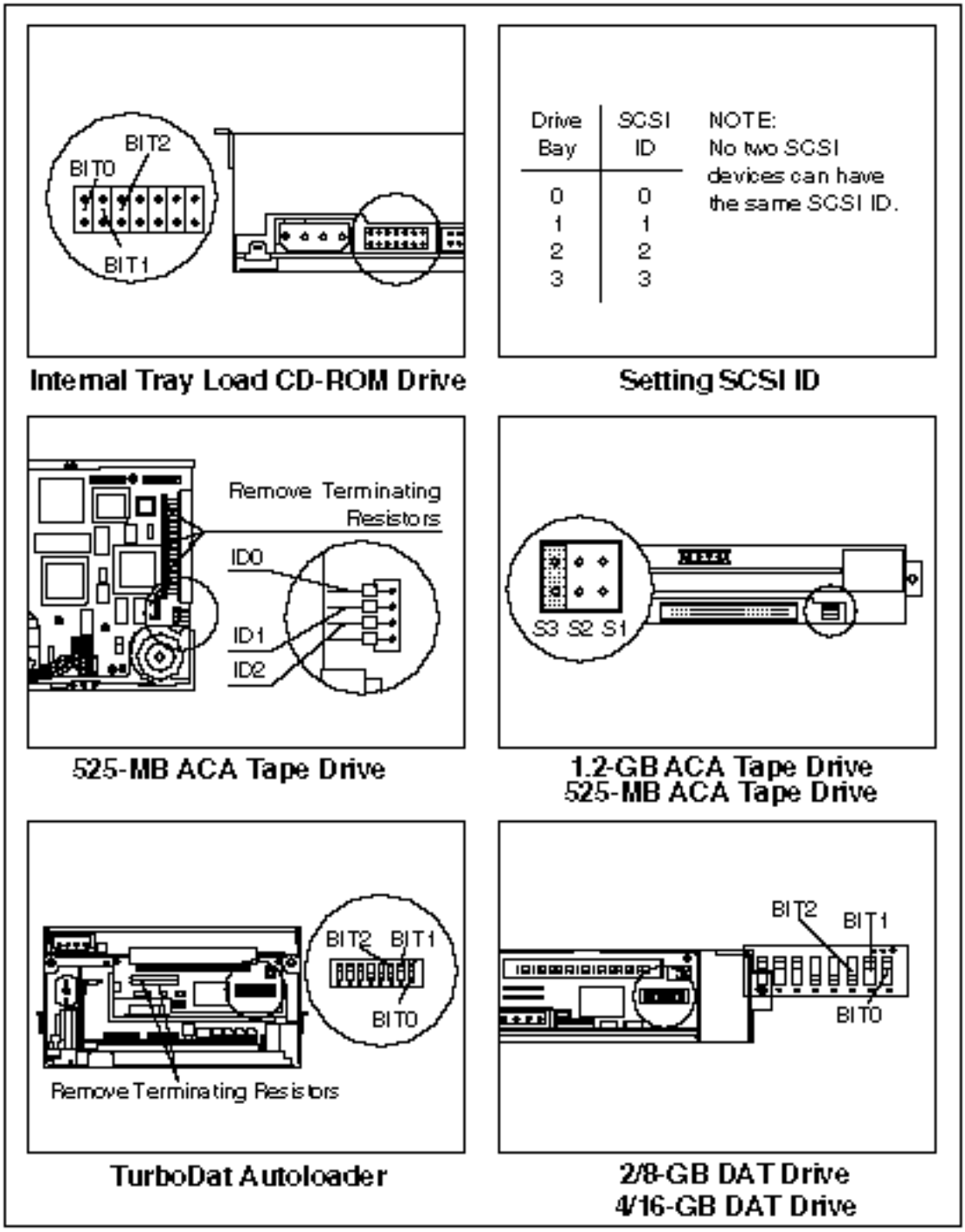

Figure 4-2. Supported SCSI Options Jumper Locations

Compaq NetFlex-2 Controller

The Compaq NetFlex-2 Controller has one jumper block which selects either Ethernet or Token Ring.

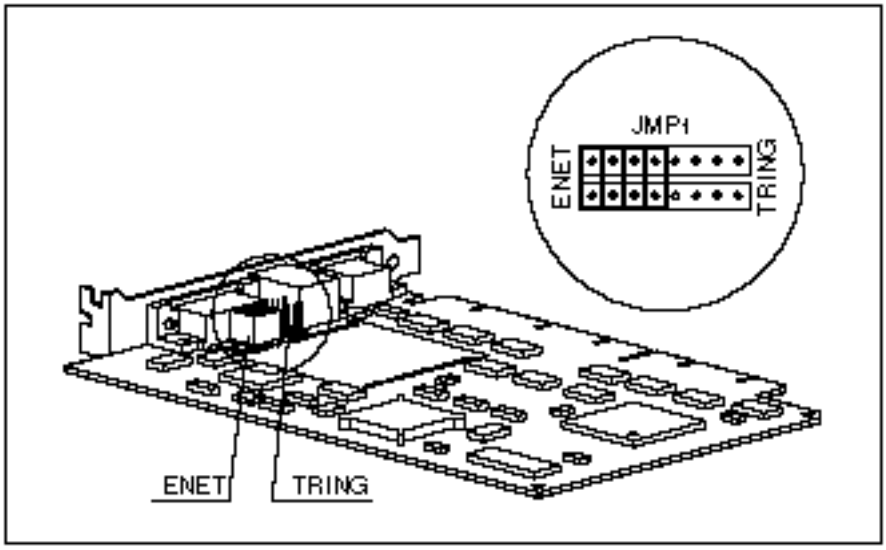

Figure 4-3. Location of 32-Bit NetFlex-2 Controller Jumpers for Ethernet

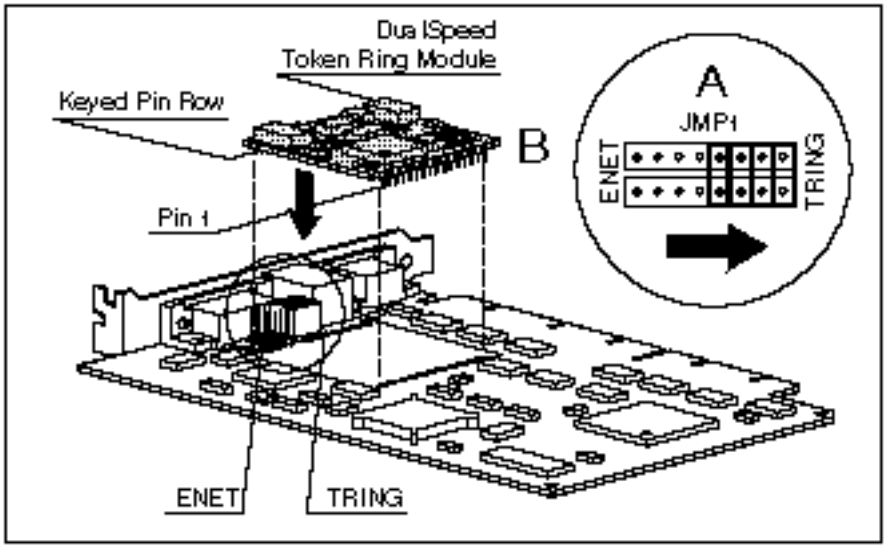

Figure 4-4. Location of 32-Bit NetFlex-2 Controller Jumpers for Token Ring

PHYSICAL AND OPERATING SPECIFICATIONS

This section provides operating and performance specifications for the following Compaq components.

- System Unit
- Power Supply
- Hard Drives
- Diskette Drives
- CD-ROM Drives
- SIMMs
- Fast-SCSI-2 Controller
- Fast-Wide SCSI-2 Controller
- Drive Array Pairs
- NetFlex-2 Controller
- NetFlex-3 Controller

Table 5-1
System Unit Specifications

Dimensions		
Height	25.80 in	65.3 cm
Depth	22.40 in	56.9 cm
Width (feet retracted)	8.75 in	22.2 cm
Width (feet extended)	16.15 in	41.0 cm
Weight	59.8 lb	27.09 kg
Input Requirements		
Nominal Line Voltage	100-120 VAC	220-240 VAC
Range Line Voltage	90 to 132 VAC	180 to 255 VAC
Line Frequency	50-60 Hz	50-60 Hz
Rated Input Current	8 A	4 A
Power Supply		
Standard	490 W	540 W
Redundant	490 W	540 W
Temperature Range:		
Operating	50° to 93° F	10° to 35° C
Shipping	-22° to 140° F	-30° to 60° C
Heat	2696 BTU/hr	2696 BTU/hr
Relative Humidity (noncondensing)		
Operating	20% to 80%	20% to 80%
Nonoperating	5% to 90%	5% to 90%
Maximum Wet Bulb Temperature	101.7° F	38.7° C

Table 5-2
Power Supply Specifications

Input Specifications		
Nominal Line Voltage	100 to 120 VAC	220 to 240 VAC
Range Input Line	90 to 132 VAC	180 to 255 VAC
Frequency Range	47 to 63 Hz	47 to 63 Hz
Power Factor	0.95	0.95
Input Power	825 W	900 W
Input Current	10.0 A at 120 VAC	5.0 A at 240 VAC
Inrush Current	50 A at 132 VAC (cold start)	100 A at 255 VAC (cold start)
Holdup Time	20 ms from zero crossing at 120 VAC	20 ms from zero crossing at 240 VAC
General Specifications		
Full Output Rating	To 35°C and 5,000 ft	
	To 32°C and 10,000 ft (derate linearly)	
Minimum Load	3.0 A on + 5V output; 0.5A on +12V output	
Ambient Temperature Range		
Operating	50° to 120° F	10° to 55° C
Storage	-16° to 128° F	-30° to 60° C
Dielectric Voltage Withstand		
Input to Output	3000 VAC/ minute	
Input to Ground	1500 VAC/ minute	
Safety Standard	UL 1950; CSA 22.2 #950 or CSA 22.2 #234; TUV/VDE EN 60 950 (VDE0805/11.92); EMKO-TUE (74-SEC) 207/94	
EMI	CISPR Publication 22 Class B; BMPT - AmtsblVfg 243/1991; CFR 47, Part 15 Class B.	
Meets Requirements in:		
	IEC 801-2	
	IEC 801-3	
	IEC 801-4	
	EN50 082	

Table 5-3
Redundant Power Supply Specifications

Input Specifications		
Nominal Line Voltage	100 to 120 VAC	220 to 240 VAC
Range Input Line	90 to 132 VAC	180 to 255 VAC
Frequency Range	47 to 63 Hz	47 to 63 Hz
Power Factor	0.95	0.95
Input Power	825 W	900 W
Input Current	10.0 A at 120 VAC	5.0 A at 240 VAC
Inrush Current	50 A at 132 VAC (cold start)	100 A at 255 VAC (cold start)
Holdup Time	20 ms from zero crossing at 120 VAC	20 ms from zero crossing at 240 VAC
General Specifications		
Full Output Rating	To 35°C and 5,000 ft	
	To 32°C and 10,000 ft (derate linearly)	
Minimum Load	3.0 A on + 5V output; 0.5 A on +12V output	
Ambient Temperature Range		
Operating	50° to 120° F	10° to 55° C
Storage	-16° to 128° F	-30° to 60° C
Dielectric Voltage Withstand		
Input to Output	3000 VAC/ minute	
Input to Ground	1500 VAC/ minute	
Safety Standard	UL 1950; CSA 22.2 #950 or CSA 22.2 #234; TUV/VDE EN 60 950 (VDE0805/11.92); EMKO-TUE (74-SEC) 207/94	
EMI	CISPR Publication 22 Class B; BMPT - AmtsblVfg 243/1991 limits; CFR 47, Part 15 Class B limits.	
Meets Requirements in:		
	IEC 801-2	
	IEC 801-3	
	IEC 801-4	
	EN50 082	

Table 5-4
SIMM Specifications

Size	4, 8, 16, 32, 64 MB
Speed	60, 70, 80 ns
Width	32 Bits
Upgrade Requirement	Any matched four SIMMs

NOTE: The ProLiant 4500 Server must add system RAM four modules at a time, SIMMs must be the same size and speed. SIMM modules must be 60-, 70-, or 80-ns. Use Compaq SIMMs or JEDEC-compliant SIMMs that conform to this parity scheme only.

Table 5-5
Internal Diskette Drives

	1.44-MB (standard)	**1.2-MB (optional)**
Size	3 1/2-In	5 1/4-In
LED Indicators (front panel)	Green	Green
Read/Write Capacity per Diskette (high/low density)	1.44 MB/720 KB	1.2 MB/360 KB
Drive Supported	One	One
Drive Height	One-third	One-third
Drive Rotation (rpm)	300	360
Transfer Rate bits/sec (high/low)	500 K/250 K	500 K/300 K
Bytes/Sector	512	512
Sectors/Track (high/low)	18/9	15/9
Tracks/Side (high/low)	80/80	80/40
Access Times:		
Track-to-Track (high/low)	3 ms/6 ms	3 ms/10 ms
Average (high/low)	169/94 ms	148.3 ms/95ms
Settling Time	15 ms	15 ms
Latency Average	100 ms	84 ms
Cylinders (high/low)	80/80	80/40
Read/Write Heads	Two	Two

Table 5-6
CD-ROM Specifications

Capacity	680 MB or greater, dependent on disc format
Data Transfer Rate	
Sustained	300 or 150 Kbytes/sec
Asynchronous	2.5 MB/sec
Synchronous	4.0 MB/sec
Access Times	
Full Stroke	520 ms
One-Third Stroke	290 ms
Cache/Buffer	256 Kbytes (minimum)
Audio Output Level	
Line Out	0.7 VRMS at 47 kohms
Headphone	0.55 VRMS at 32 ohms (at maximum volume)
Weight	
External CD-ROM	6 lb 6 oz (2.85 kg)
Internal CD-ROM	1 lb 2 oz (1.25 kg)
Dimensions (w x h x d, excluding projections)	
External CD-ROM	7.01 x 1.9 x 1.3 in (17.8 x 4.9 x 3.3 cm)
Internal CD-ROM	5.9 x 1.7 x 0.8 in (14.9 x 4.3 x 2.1 cm)

Table 5-7
SMART SCSI Array Controller

Drives Supported	Up to 14
Data Transfer Method	32-Bit Bus Master
Maximum Transfer Rate on EISA Bus	33 MB/s
Simultaneous Drive Transfer Channels	2
Reliability Features	
Drive Mirroring (RAID 1)	Yes
Data Guarding (RAID 2)	Yes
Distributing Data Guarding (RAID 5)	Yes
N+1 Distributed Data Guarding	Yes
On-Line Spare	Yes
Mirrored with Data Striping (RAID 10)	Yes
Drive Failure Alert System	LED Indicators
Cache Memory for Accelerator	4 MB Mirrored
Batteries	Yes
Battery without Power	Yes
Charge	Trickle

Table 5-8
550-Megabyte Pluggable Fast-SCSI-2 Drive Specifications

Capacity	558.5 MB
Block Size	512 Bytes
Interface	Single-Ended Fast-SCSI-2
Synchronous Transfer	Up to 10 MB
Buffer Size	256 Kbytes
RPM	5400 rpm
Average Access	10.5 ms

Table 5-9
1.05-Gigabyte Pluggable Fast-SCSI-2 Drive Specifications

Capacity	1050.1 MB
Block Size	512 Bytes
Interface	Single-Ended Fast-SCSI-2
Synchronous Transfer	Up to 10 MB
Buffer Size	256 Kbytes
RPM	5400 rpm
Average Access	10.5 ms

Table 5-10
2.1-Gigabyte Pluggable Drive Specifications

	Fast-SCSI-2	Fast-Wide SCSI-2
Capacity	2104.3 MB	2104.3 MB
Block Size	512 Bytes	512 Bytes
Interface	Single-Ended Fast-SCSI-2	Single-Ended Fast-Wide SCSI-2
Synchronous Transfer	Up to 10 MB	Up to 20 MB
Buffer Size	256 Kbytes	256 Kbytes
RPM	6400 rpm	7200 rpm
Average Access	9.5 ms	9.0 ms

Table 5-11
4.3-Gigabyte Pluggable Drive Specifications

	Fast-SCSI-2	Fast-Wide SCSI-2
Capacity	4293.6 MB	4293.6 MB
Block Size	512 Bytes	512 Bytes
Interface	Single-Ended Fast-SCSI-2	Single-Ended Fast-Wide SCSI-2
Synchronous Transfer	Up to 10 MB	Up to 20 MB
Buffer Size	512 Kbytes	512 Kbytes
RPM	7200 rpm	7200 rpm
Average Access	9.0 ms	9.0 ms

Table 5-12
Compaq Integrated Fast-Wide SCSI-2 Controller

Drives Supported	Up to 7 total (internal and external)
Data Transfer Method	32-bit bus master
SCSI Channel Transfer Rate	10 MB/sec
Maximum Transfer Rate on EISA Bus	33 MB/sec
SCSI Termination	Active termination
SCSI Connectors	1 external, 2 internal

Table 5-13
Compaq 32-Bit Fast-Wide SCSI-2/E Controller

Dimensions		
Height	4.5 in	11.43 cm
Depth	0.375 in	0.95 cm
Width	10.5 in	26.67 cm
Total Weight	7.13 oz	205 g
Drives Supported	Up to 7 total (internal and external)	
Data Transfer Method	32-bit bus master	
SCSI Channel Transfer Rate	10 MB/sec	
Maximum Transfer Rate on EISA Bus	33 MB/sec	
SCSI Termination	Active termination	
SCSI Connectors	1 external, 2 internal	

Table 5-14
Compaq Integrated Fast-SCSI-2 Controller

Drives Supported	Up to 7 total (internal and external)
Data Transfer Method	32-bit bus master
SCSI Channel Transfer Rate	10 MB/sec
Maximum Transfer Rate on EISA Bus	33 MB/sec
SCSI Termination	Active termination
SCSI Connectors	1 external, 2 internal

Table 5-15
Compaq 32-Bit Fast-SCSI-2 Controller

Dimensions:		
Height	4.5 in	11.43 cm
Depth	0.375 in	0.95 cm
Width	10.5 in	26.67 cm
Total Weight	7.13 oz	205 g
Drives Supported	7	
Data Transfer Method	32-bit bus master	
SCSI Bus Transfer Rate (maximum)	10 MB/sec	
Maximum Transfer Rate on EISA Bus	33 MB/sec	
SCSI Termination	Active termination	
SCSI Connectors	1 external, 2 internal	

Table 5-16
Compaq NetFlex-2 ENET-TR Controller

Dimensions		
Height	5.1 in	12.9 cm
Depth	7.4 in	18.8 cm
Width	0.51 in	1.3 cm
Total Weight		
Ethernet Configuration	5.44 oz	150 g
Token Ring Configuration	5.76 oz	170 g
Processor	TI TMS380C26	
Coprocessor	TI Packet Blaster (TMS380FPA)	
Data Transfer Method	32-bit EISA bus master	
Maximum Transfer Rate on EISA bus	933 MB/sec	
Standard Network Controller Configuration - Ethernet		
Meets IEEE 802.3 Specifications		
Supports AUI (DB-15)		
Supports 10BaseT (RJ-45)		
Supports Optional AUI to BNC Adapter		
Optional Network Controller Configuration - Token Ring		
Meets IEEE 802.5 Specifications on STP cable		
Meets proposed specifications on STP cable		
Supports Token Ring Interface (4- or 16-megabit per second data transfer rates)		
Supports STP (DB-9)		
Supports UTP (RJ-45)		

Table 5-17
Compaq NetFlex-3/E Controller

Dimensions		
Height	0.75 in	1.91 cm
Length	8.2 in	20.7 cm
Width	5.0 in	12.7 cm
Total Weight	5.76 oz	159 g
Network Controller Chipset	TI ThunderLAN	
Data Transfer Method	32-Bit EISA Bus master	
Interrupts Supported	5, 9, 10, and 11	
LEDs	Link and Network Activity	